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ABSTRACT

This study examined the earnings and wage rate differentials between Federal government and private sector workers in 1960 and 1970 to consider the comparability of these workers and the application of the Comparability Doctrine in Federal pay policy during that period. Two types of earnings and wage rate equations were estimated by ordinary least squares for all Federal and all private workers and eight race-sex groups of Federal and private workers. The data came from the 1960 and 1970 Public Use Samples. Ronald Oaxaca's technique for analyzing differentials was employed to decompose the estimated differentials into a part attributable to differences in characteristics between the two types of workers and a part ascribed to economic rent paid to Federal workers. These results indicated that Federal earnings and wage rates exceeded private in both years for every group examined. The largest proportion of the differentials, over 70 percent in most cases, for most race-sex groups consisted of economic rent paid to Federal workers. It was concluded that the source of this is the Federal career employees system. It was recommended that the number of applicants at each Federal job level be weighted in considerations of Federal pay raises. (The document concludes with eight pages of a selected bibliography and an appendix of the means of variables.) (Author)

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WAGE DIFFERENTIALS BETWEEN FEDERAL GOVERNMENT AND PRIVATE SECTOR WORKERS

By SHARON PATRICIA SMITH

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A thesis submitted to
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of
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in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

Written under the direction of
Professor Michael K. Taussig
of the Department of Economics
and approved by

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ABSTRACT OF THE THESIS

Wage Differentials between Federal Government and Private Sector Workers

By SHARON PATRICIA SMITH, Ph.D.

Thesis director: Professor Michael K. Taussig

This study examined the earnings and wage rate differentials between Federal government and private sector workers in 1960 and 1970 to consider the comparability of Federal and private workers in the two years and the application of the Comparability Doctrine in Federal pay policy during that period. Two types of earnings and wage rate equations were estimated by ordinary least squares: one type which included personal characteristics variables and the other which, in addition, included occupational variables. These were estimated for all Federal and all private workers and eight race-sex groups of Federal and private workers. The data used were subsamples from the 1960 and 1970 Public Use Samples.

Ronald Oaxaca's technique for analyzing differentials was employed to decompose the estimated differentials into a part attributable to differences in characteristics between the two types of workers and a part ascribed to economic rent paid to Federal workers. Because earnings were thought to reflect stability of employment during the year while wage rates did not, a comparison of the two differentials enabled consideration of the influences of differ-

ences in this non-pecuniary benefit in the two sectors on the earnings differential.

These results indicated that Federal earnings and wage rates exceeded private earnings and wage rates in both years for every group examined and that for most groups the largest proportion of the differential, over 70 per cent in the majority of the race-sex groups, consists of economic rent paid to Federal workers. In both years the largest gross differential and economic rent in both earnings and wages rates were for white males. It was concluded that the source of this persistent economic rent is the Federal system of career employees which acts as a restrictive force which leads to non-competing groups.

The results of this thesis implied that the Comparability Doctrine was conceived in error and implemented unnecessarily. However, it was recognized that some structure is necessary to coordinate the complex Federal pay relationships and that many external forces impinge on this structure. It was recommended that an accurate estimate be obtained of the number of applicants at each Federal job level in considering Federal pay raises both as a check on the implications of the comparisons with private sector jobs and to account for the influence of other market forces on the Federal pay structure.

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PREFACE

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CHAPTER I

INTRODUCTION

During the period following World War II, the United States entered a new stage of economic development as it became the first "service economy" in the world. This transition to an economy in which more than half of total employment is engaged in the provision of services has resulted from the growth of service employment which has occurred throughout the past century but at an increasing rate since 1929.[1] Three trends in employment in the post-war period have been particularly important in this transition: agricultural employment has been declining, government employment has been growing very rapidly, and manufacturing employment has been relatively stable, particularly since the mid-1950's.[2] Employment in all levels of government (local, state, and Federal) has grown from 10.2 per cent of total employment in 1947 to 16.6 per cent of total employment in 1970.[3] This major change in the composition of total employment is a reflection of both the increasing demand for services and service-intensive goods and the nature of their production functions. Moreover, these developments can be expected to have further impact on the composition of employment in the future. The presence and growth of a large government sector can be expected to have important effects on the use of human resources quite distinct from those which result from the growth of the privately owned service sector.

In 1973, the composition of government employment (including part-time and intermittent employees) was

U.S. Armed Forces	2,323,000
U.S. Government	2,865,000
State Government	2,921,000
Local Government	7,804,000

The Federal government employs more civilians than any other single unit of government: it employs a total of 3.3 per cent of this country's work force.[4] Therefore, insight into the effects of the entire government sector on our manpower uses and needs can be gained by focusing attention on the role of the Federal government as an employer.

This subject will be considered in this thesis through the study of earnings and wage differentials between Federal government and private sector workers in 1960 and 1970. Before commencing such a study, an understanding of the institutional framework for wage determination in the Federal government and a review of the relevant literature on wage differentials is valuable. These topics will be considered in detail in Chapters II and III.

Wages for Federal civilian employees are defined by several different statutory systems depending on occupation and/or government agency of employment. Although the belief that Federal workers should receive wages comparable to those paid in the private sector has prevailed for over a century, detailed reform in the wage systems to achieve the goal of equal pay for equal level of work was not enacted until the 1960's. Through a series of laws, a procedure was specified for each of the pay systems by which average pay rates in the private sector were to be estimated in order to make the comparison with Federal pay rates by level of work. If increases in Federal pay were required to achieve comparability with the specified private workers, recommendations were to be made to Congress to enact the necessary increases. "Full" comparability was to have been achieved in wages (but with no consideration of fringe benefits) by 1970.

Several questions arise from this policy of comparability. It is important to determine whether private pay rates exceeded Federal pay rates in 1960 and whether the two became comparable in 1970 as the policymakers have maintained. The goal of this policy was to attain pay rates which are comparable at the same level of work in both sectors. Therefore, another question which arises is whether workers of comparable productivity receive comparable pay in both sectors. The answer to this question has implications for the validity of the government's definition of comparability and of the structure of its pay systems.

In order to study these questions, the annual earnings and estimates of the hourly wages of Federal and private workers derived from a subsample of the Public Use Samples of 1960 and 1970 are examined. Separate earnings and wage equations are estimated for each sector. In addition, Federal and private workers are each divided into whites, non-whites, males, females, white males, white females, non-white males, and non-white females. Two types of earnings and wage equations are estimated for each group. One type equation includes only personal characteristics and urban residence as explanatory variables while the other includes, in addition, occupational variables. Differences in the returns to education and experience and in the effects of discrimination by race and by sex are examined for the different groups for both of the equations.

The gross differentials (the differences between the means of earnings and of wage rates) between Federal and private workers for each of these subdivisions can then be decomposed into a portion attributable to differences in productivity and a portion which remains for comparable workers. The technique employed to make this decomposition is that used by Oaxaca and by Malkiel and Malkiel in their studies of sex discrimination. The model underlying the estimated wage and earnings equations and the technique for decomposing the differentials are discussed in detail in Chapter IV. The equations and differentials estimated for all Federal and private workers in 1960 and 1970 as well as those estimated for the eight sub-groups of Federal and private workers (whites, non-whites, males, females, white males, white females, non-white males, and non-white females) in both years are examined in Chapters V and VI. The implications of these results for the Comparability Doctrine and the Federal pay systems are considered there and in Chapter VII.

Footnotes

[1] Victor R. Fuchs, *The Service Economy* (New York: National Bureau of Economic Research, 1968), pp. 1-2.

[2] *Ibid.*, p. 19.

[3] U. S. Department of Labor, *Handbook of Labor Statistics 1972*, Bulletin 1735 (Washington, D.C.: U. S. Government Printing Office, 1972), pp. 26, 102.

[4] U. S. Civil Service Commission, *The Federal Career Service...at Your Service* (Washington, D.C.: U. S. Government Printing Office, 1973). (Hereinafter referred to as *Federal Career Service*.)

CHAPTER II

INSTITUTIONAL BACKGROUND

Employees of the Federal government are paid under several different statutory systems established by Congress. These systems represent the legal enactment of the principles governing Federal pay policies. In the last decade a significant change was made in Federal pay policy with the enactment into law of the Comparability Doctrine which maintained that Federal and private workers at the same level of work should receive comparable pay. The exact procedures for instituting this policy varied among the different statutory pay systems. Before considering the results of this policy, a brief review of the principles of the major pay systems and of the procedures for applying the Comparability Doctrine is essential.

Federal Pay Systems

Federal civilian employees are paid under several different systems. In 1973, 46 per cent of all Federal civilian employees were paid under the General Schedule. This system classifies jobs by occupation and level of work into 425 job series and 18 grades. The pay scales apply uniformly throughout different geographic regions and are fixed by law. Most white-collar Federal civilian employees (clerical, technical, career professional, and administrative) and protective employees are included under this system. In 1973, 22.3 per cent of Federal civilian employees were blue-collar workers in crafts, trades, and labor occupations, most of whom are paid under the Federal Wage System of the Civil Service Commission. Their pay rates are set to conform with rates paid to private employees in the same locality performing similar functions. The national schedules of the United States Postal Service covered 24.7 per cent of all Federal civilian employees in 1973. Salaries depend on duties performed. The 1970 Postal Reorganization Act authorized the Postal Service to set the pay of postal employees which it usually does by negotiation with employee organizations (union or other). Most Postal Service employees are paid under the Postal Service Schedule which has 22 levels of responsibility and difficulty. The remaining employees, who were under the General Schedule pay system in the old Post Office Department, are now under the Postmaster and Supervisor Schedule. Special pay plans covered 7 per cent of all Federal civilian employees in 1973. Groups under such pay plans include the Central Intelligence Agency, the Tennessee Valley Authority, the Atomic Energy Commission, the Foreign Service, top officials in the executive branch, and others.[1]

Fringe Benefits

Federal civilian employees also receive such fringe benefits as annual leave, sick leave, holidays, health benefits, life insurance, injury compensation, retirement, unemployment compensation, and severance pay. Annual leave varies with the number of years spent in the Federal service (civilian plus creditable military service): for the first three years, annual leave is thirteen days a year; for the next twelve years, it is twenty days a year; and after fifteen years, it is twenty-six days a year. Sick leave is thirteen days a year. In addition, there are nine holidays.[2] There are thirty-six plans under the voluntary Federal Employees Health Benefits program which is administered by the Civil Service Commission. The government's share of the total premium was 38 per cent in 1960 and was raised to this again in 1966. By 1969, however, the government's share had dropped to 27 per cent.[3] Life insurance and accidental death and dismemberment insurance are available to Federal employees without taking a physical examination. The amount is usually at least $2,000. more than the employee's annual base pay. The employee pays two-thirds of the premium for this amount of insurance and the government pays the remaining one-third. The employee may also purchase an additional $10,000. of insurance through payroll deductions but he pays the full premium. The government supplies injury compensation and death benefits for employees who suffer these in the performance of their duties.[4]

The retirement system for Federal employees has been in operation since the twenties but has been troubled for a long time with a huge unfunded liability and the probability of eventual bankruptcy due to insufficient government contributions. However, legislation was enacted in

1969 to help correct this situation with improved financing.[5] Under this system, 7 per cent of the salary of career and career-conditional Federal employees is withheld for the retirement fund. The employee's contribution to this fund will be returned to him if he leaves prior to five years of service. If he leaves after five or more years of service, he may choose either to have his money returned to him or leave it in the fund and receive an annuity beginning at sixty-two. If the employee becomes disabled after five or more years of service, he may retire and receive an annuity immediately. Retirement benefits are based on the highest average salary earned during any three consecutive years of government service. For example, a Federal employee with thirty years of service may retire at age fifty-five and receive 56 1/4 per cent of the highest average salary he earned during any three consecutive years of his career.[6] Survivor annuities are also paid to qualifying spouses and children of Federal employees. There is also a cost-of-living annuity increase based on the Consumer Price Index.[7]

Unemployment compensation similar to what eligible private employees receive is also available to Federal employees who have left the Federal service through layoffs or terminated appointments. The conditions for this unemployment insurance are those set by the state in which they work. Severance pay is provided for Federal employees who are ineligible for immediate retirement benefits but have been separated without cause. Severance pay depends on years of Federal service and years of age over forty. It cannot be greater than the employee's basic annual compensation.[8]

Comparability Doctrine

The question arises whether there is some guiding principle behind these Federal pay systems. Of the four principles that have been suggested -- ability to pay, cost of living, productivity, comparability of wages -- it appears that the comparability principle has become the guiding one in Federal wage determination.[9] This principle has had a long history in the legislation of Federal wage determination. This can be traced to an 1862 law in which Congress instructed the Secretary of Navy to set wages of blue-collar workers so that they would conform "with those of private establishments in the immediate vicinity."[10] This is the origin of the wage determination process for Federal Wage System employees described above. However, until the late 1960's, pay rates for the same blue-collar jobs varied significantly among different Federal agencies since each agency set pay rates for its own employees. Each agency used somewhat different job definitions and different surveys of pay rates of comparable private sector jobs which were statistically invalid. The differentials for similar blue-collar jobs in the same vicinity in different Federal agencies were as much as sixty-four cents per hour in 1964.[11] An important step in eliminating such differentials was taken on December 1, 1967 with the approval of the Coordinated Federal Wage System which provided that blue-collar workers performing the same job in the same locality should receive the same pay regardless of what Federal agency employs them.[12] This new system thus provided that Federal blue-collar jobs be evaluated and ranked on a common basis and that the comparison with private sector rates be made using surveys of statistically valid samples selected by the Bureau of Labor Statistics.[13]

In order to make the Coordinated Federal Wage System workable, the number of wage areas for comparison was reduced to 152 from 330 and the number of job grading standards from 1,300 to 200. Approximately one-third of the wage areas were surveyed in the first surveys ordered in July 1968 and the employees then were covered by the new system. Surveys of the remaining two-thirds of the wage areas were scheduled to be completed in fiscal 1970.[14] The entire set of job grading standards was scheduled to be completed by fiscal 1972. Although this system did not permit union negotiation on pay or strikes, it did recognize Federal employee unions and did invite their participation in other aspects of the pay-setting process.[15] The Coordinated Federal Wage System was replaced in 1972 by the Federal Wage System. This system also provided uniform practices for setting rates of pay for Federal employees which would be equal across agencies in the same local wage area and comparable to those paid to private employees in that area. However, pay distinctions within the same area in accordance with work, qualification, and responsibility distinctions were permissable.[16] To implement this system, the same basic procedure is followed as that under the Coordinated Federal Wage System: the comparison to private rates is made on the basis of surveys conducted by the Bureau of Labor Statistics and several paylines are fitted to the survey data as guidelines for determining scheduled pay rates.

Legal recognition of the comparability principle for other civilian employees of the Federal government came in the early 1960's. In 1962, after studies had been made of the relationship between Federal government and private sector salaries, Congress and President Kennedy agreed that a wage differential between the Federal government and the private sector should not exist and action should be taken in order that "federal pay rates be comparable with private enterprise pay rates for the same level of work."[17] The Federal Salary Reform Act of 1962, the Federal Pay Acts of 1967, and Federal Pay Comparability Act of 1970 were passed in order to achieve this goal. The Federal Salary Reform Act of 1962 was directed toward making the salaries of Federal white-collar workers comparable with private sector salaries for the same levels of work. Consequently, it covered the following salary systems: the Postal Field Service, the General Schedule, and the salary systems for dentists, physicians, and nurses in the Department of Medicine and Surgery of the Veteran's

Administration.[18] A number of civilian agencies have chosen to follow the General Schedule in this policy although they are not required to do so by law. In addition, a 1967 law required the pay in the military forces to be increased immediately following a General Schedule increase.[19]

"PATC" Survey

The Federal Salary Reform Act of 1961 authorized the Office of Management and Budget and the Civil Service Commission to make a report comparing Federal with private sector salaries on the basis of information found in the National Survey of Professional, Administrative, Technical, and Clerical Pay -- the "PATC" survey -- conducted by the Bureau of Labor Statistics. This survey contains information on seventy-nine jobs in thirteen of the first fifteen General Schedule work levels: fifty concerning professional and administrative work, five supervisory clerical work, fifteen clerical work, and nine technical work. These include seventeen of the roughly 430 occupations the General Schedule covers. The jobs included in the "PATC" survey must meet the following criteria: the work must be basically the same in the private and Federal sectors; the job must be important in numbers in both sectors; it must be surveyable by the job-matching method; it must be covered by a published Civil Service Commission classification standard; and, in the private sector, it must be present across industry lines.[20] This survey has been constantly re-assessed and revised for better application of the comparability principle for Federal white-collar workers. However, it is important to note that its coverage is "based on Bureau of the Budget and Civil Service interpretation of Government pay policy."[21] The reference date for the survey is March. (Prior to 1972, it was June.) It covers all geographical areas of the United States except Alaska and Hawaii. (Prior to 1965, it excluded non-metropolitan areas.) It includes establishments with a minimum of 50 to 250 employees, depending on the industry. The industries covered are: manufacturing; transportation, communication, electric, gas, and sanitation services; wholesale trade; retail trade; finance, insurance, and real estate; engineering and architectural services; and commercially operated research, development, and testing laboratories.[22]

The "PATC" survey, then, provides the information necessary for the Salary Survey Liason Committee (composed of members of the Office of Management and Budget and the Civil Service Commission) to make a comparison of Federal and private sector salaries. In order to make this comparison, an arithmetic average is taken of all private sector pay rates at each grade, giving equal weight to all jobs surveyed at each grade. However, the Federal Salary Reform Act of 1962 also required that "pay distinctions shall be maintained in keeping with work and performance distinctions,"[23] and these arithmetic averages do not provide such distinctions. Consequently, to achieve the two goals of Federal pay rates comparable to private rates and proper pay distinctions for different Federal grades, a comparability payline is constructed. Before considering the construction of this payline, however, it is important to note the inadequacies of the "PATC" survey.

By administrative action, workers in certain segments of the private sector (all industries in agriculture, forestries, and fisheries; mining; and contract construction; certain industries in transportation and services; and establishments below minimum size, which varies according to industry) and, by law, state and local government employees were excluded from the "PATC" survey in the belief that their numbers of white-collar workers were too small to seriously affect national salary estimates and "their pay determination did not result from free play over bargaining tables and other salary-determining processes."[24] In addition, employees of non-profit organizations were excluded by administrative action in the belief that these organizations did not conform with the definition of the private sector. The General Accounting Office has estimated that, as a result of these exclusions, the "PATC" survey covers just over one-fourth of the total twenty-one million non-Federal white-collar employees, excluding the self-employed. These workers are categorized in Table 1.

Table 1

Non-Federal White-Collar Employees

	millions	per cent
Employees in establishments within the survey universe	7.2	25.7
Employees in establishments within the scope but below the minimum size of the survey	7.2	25.7
Employees in establishments in excluded industries	4.9	17.5
Employees in non-profit organizations	2.5	9.0
Employees in state and local governments	6.2	22.1

Source: Comptroller General of the United States, U. S. General Accounting Office, Report to Congress, Improvements Needed in the Survey of Non-Federal Salaries Used as a Basis for Adjusting Federal Salaries, B-167266 (Washington, D.C.: U. S. General Accounting Office, May 11, 1973), p. 27.

The GAO has recommended that the exclusions made in the "PATC" survey should be eliminated as much as possible on the grounds that

> (1) the significant growth rates of the excluded segments have made them major competitors with the Government in the various labor markets and (2) the rising importance of labor-management bargaining in salary determination processes for State and local government employees has made their salary rates reflect various factors which similarly affect pay in private enterprise.[25]

In its study of the "PATC" survey, the GAO also found that the survey was not representative of the Federal jobs at certain levels. The survey data for four GS levels was criticized specifically. At GS-5, the GAO found that the survey included a smaller proportion of clerical jobs and a larger proportion of college-hire-type jobs than are found in the Federal sector. This would give the survey average at GS-5 an upward bias. Similarly, at GS-7 and GS-9, the survey included a smaller proportion of journeyman jobs and a larger proportion of developmental positions than are found in the Federal sector. This would give the survey averages at GS-7 and GS-9 an upward bias also. At GS-15, only three jobs were included -- attorney, engineer, and chemist. Approximately 24 per cent of the Federal workers at GS-15 were represented by these three positions which turned out to be among the highest paid at that level in the private sector. Therefore, the survey at this level would also be upward biased. In order to correct these problems, the GAO recommended that the survey be expanded at each of these levels to more adequately reflect the range of work and responsibilities found at each of these levels in the Federal government.[26]

Comparability Payline

The comparability payline is fitted to a scatter diagram of the average private pay rates. The payline actually used in computing the comparable Federal pay rates is a compromise between the payline giving the best fit to the scatter diagram of private pay rates and the payline providing uniform percentage differentials in Federal pay between adjacent grades. The Official payline which has been used to construct salary schedules since 1967 is a compromise, then, between the Uniform Line and the Nassimbene Line. The Uniform Line satisfies the requirement that pay distinctions be in keeping with work distinctions by providing for uniform percentage differentials between the following adjacent grades: GS-1,3,5,7,9,11,12,13,14,15,16,17, and 18. The reason for this can be traced to the original Classification Act of 1923. According to the classification system, the clerical and technician grades from GS-1 through GS-10 cover approximately equal work intervals while the professional grades, beginning at GS-5, cover work intervals approximately double the size of the clerical grades. The Uniform Line was derived from the averages of private sector pay rates using the formula: $y = ab^x$; where "y" = the salary to be derived for each grade, "a" = the salary rate to be derived for each base grade, "b" = one plus the intergrade differential, and "x" = the number of work intervals between the base grade and the grade for which the salary rate is being derived.[27]

However, when this line is fitted to the private sector pay averages, there are severe disadvantages in the resulting Federal comparability pay rates. Although the Uniform Line provides the required uniform percentage differentials and pay rates comparable to the private sector averages, the pay rates derived for the upper and lower grades are undesirable. At GS-5, which is a college recruitment grade, the Uniform Line lies 24 per cent below the private sector averages for professional and administrative jobs surveyed at this work level. Consequently, it is argued that the use of these rates would put the Federal government at a severe disadvantage in recruiting college graduates. However, this may also reflect the possibility of upward bias in the survey data for this level noted above. The rates the Uniform Line provides for GS-16, GS-17, and GS-18, on the other hand, are too high to be consistent with present policy regarding the relationship between Congressional salaries and those of political executives.[28]

In order to resolve the difficulties concerning the pay rates the Uniform Line provides for the upper and lower grades, the Nassimbene Line was suggested. This line is of the form: $y = ab^{x.7}$ (where y, a, b, and x are defined as above). This, then, makes the intergrade differentials larger among the lower grades and decreasing through the upper grades. However, while this payline did bring rates at GS-5 closer to "comparable" private sector averages, the differences in intergrade differentials were so great that they were no longer in keeping with work distinctions.[29]

In order to reconcile these differences, the Official Line was developed. Like the Nassimbene Line, the Official Line provides for larger differentials among the lower grades and then gradually decreasing differentials. However, the maximum difference between adjacent intergrade differentials is 2.1 per cent between the GS-1/GS-3 and GS-3/GS-5 differentials (as opposed to 8.2 per cent under the Nassimbene Line) and this decreases .2 per cent at each differential thereafter. This line, then, is an improvement over the Massimbene Line, although the pay rate at GS-5 is still low: 20 per cent below the private sector averages. The Official Line is flexible; since by increasing or decreasing the size of the differential between GS-1 and GS-3, while keeping the same pattern for the remaining differentials, the payline can be made steeper or flatter.[30]

At present, then, the Official Line is used to construct a comparability schedule for Federal pay rates. The rates derived from the payline become the fourth within-grade rates of the General Schedule. Under the General Schedule, there are 10 rates within each salary grade. The maximum rate for each grade is 30 per cent higher than the minimum rate and each increase within grade is 3-1/3 per cent of the minimum rate. These within-grade rates can be computed from the fourth within-grade rate derived from the payline. The pay rates for the other salary systems covered by the Comparability Doctrine are computed by identifying key grades in each system with grades under the General Schedule. Once these comparable pay rates are determined, they are reported to the President who then sends the report to Congress with appropriate recommendations. Congress may then act on these recommendations or take any action it chooses.[31]

Application of the Comparability Doctrine

Since enactment of the Comparability Doctrine in 1962, several laws have authorized pay increases to achieve this goal of full comparability. Data used in implementing this policy indicated the gap between private sector and Federal government salaries ranged from 18 per cent at GS-3 to 32.2 per cent at GS-17 (with Federal pay greater than private sector pay at GS-1 and GS-2). The average gap was 11 per cent. Private sector salaries rose 42 per cent between 1962 and 1970 while Federal government salaries rose 58 per cent. Thus, the data indicated that the average gap between private sector and Federal government salaries was only 6 per cent in 1970 and had disappeared six months after that.[32] However, to determine whether these conclusions were accurate, in early 1972 the General Accounting Office began a detailed (and still uncompleted) study of the application of the Federal government's pay setting system. The first of a series of reports concerning the design and conduct of the "PATC" survey was published in May 1973. Future reports will deal with the use of this survey in adjusting white-collar rates and the structure of the Federal pay systems.[33]

The GAO's criticisms of the survey and its recommendations to expand occupational coverage at certain levels and to make the sample more representative were noted above. In its comparison of average private and Federal rates after comparability adjustments had been made in 1962 and 1972, the GAO found that gaps remained between Federal and private rates. Although all the differentials had narrowed substantially over the decade, at GS-1 and GS-2, Federal rates remained much higher than private (differentials of approximately 8 and 12 per cent respectively). At GS-3, GS-11, GS-12, and GS-13, Federal rates also exceeded private rates while private rates were higher at the remaining six GS levels. The deviations for these ten GS levels ranged from 0.5 per cent to 5.1 per cent. However, the inadequacies of the "PATC" survey makes the validity of these comparisons questionable.[34] Therefore, the question of whether full comparability between private sector and Federal government pay rates has been achieved is still unresolved.

It is important to note in assessing the Comparability Doctrine that, as presently enacted, it only refers to comparable pay rates for the same level of work, not necessarily for the same job. Moreover, Federal pay rates must maintain differentials in keeping with work distinctions. Therefore, the comparability was intended to be approximate only and deviations were expected for certain industries, occupations, and geographic areas.[35] However, the basic goals of the comparability policy were, in President Kennedy's words, to

> assure equity for the Federal employee with his equals throughout the national economy -- enable the Government to compete fairly with private firms for qualified personnel -- and provide at last a logical and factual standard for setting Federal salaries.[36]

If this policy has been successful, workers who are comparable in their personal and productive characteristics should receive comparable pay. In order to examine this question, the earnings and wage differentials of Federal and private workers will be studied on the basis of data that is independent of the "PATC" survey. The policy's legal exclusion of state and local government employees from the comparison will be maintained but its administrative exclusions (of employees of non-profit organizations and of establishments in certain industries and below minimum size) will not.

Although the Bureau of Labor Statistics conducts surveys comparing private sector and Federal government expenditures on fringe benefits, these are not used in determining comparable Federal pay rates. Fringe benefits were not considered necessary in the comparison because a survey in 1962 indicated that they were equal in the private sector and the Federal government at approximately 25 per cent in each. However, this was no longer the case by 1970 when fringe benefits in the Federal government were 27.8 per cent while they were 26.6 per cent in the private sector. Greater expenditures on paid leave and retirement by the Federal government (11.6 per cent of Federal employee compensation as opposed to 8.8 per cent in the private sector) were the most important reasons for this development. Although private expenditures on insurance, health benefits, unemployment compensation, and bonuses which were unrelated to production were greater in the private sector, they did not offset the larger paid leave and retirement benefits enjoyed by Federal workers.[37] Similarly, the comparison between private sector and Federal government workers does not consider differences in non-pecuniary benefits such as hours worked, stability of employment, and intensity of work effort.

Evaluation of the Comparability Doctrine

Therefore, in assessing the effectiveness of the application of the Comparability Doctrine, it is necessary to consider several questions. One is whether the comparison of pay rates is an accurate one. Do the inadequacies of the "PATC" survey affect this comparison? As noted above, the comparison is made only on the basis of salary and ignores fringe benefits and non-pecuniary benefits such as hours worked and stability of employment. Should the comparability principle take these factors into consideration? These questions can be answered through an examination of the earnings and wage rate differentials between Federal and private workers observed in a data source independent of the "PATC" survey.

Summary and Conclusions

The Comparability Doctrine has been in effect for Federal blue-collar workers for more than one hundred years and for other Federal civilian employees for more than ten years. Sophisticated statistical procedures have been developed in order to implement the two policies of obtaining comparable pay by level of work for Federal workers while maintaining proper pay distinctions between adjacent grades of Federal workers. With the growing size of the

Federal government as an employer, it is increasingly important to understand the implications of this policy for employees, employers, and the overall economy and to assess its success.

From the employee's point of view, the Comparability Doctrine is an equitable policy which assures him that he will receive the same salary for his work that he could receive in the private sector. From the employer's point of view, payment of a comparable wage assures the employer that he will be able to keep the number of employees he wants. In the private sector, theory tells us that if the employer pays less than a comparable wage he will be unable to keep workers of the same quality and if he pays more than a comparable wage he may be at a competitive disadvantage. If government pays less than a comparable wage, it can either "lower the quality of employees or simply depend for a long period on the fact that workers do not really leave their jobs that quickly."[38] If government pays more than a comparable wage, the only limitation is "taxpayer revolt."[39] However, under such conditions, the quality of government workers should be higher. However, there is no strong force within the system of wage determination in government to make wages there tend toward comparability with those paid in the private sector or to correct any discrepancies which result from the application of the comparability principle as currently enacted.

From the viewpoint of the economy as a whole, however, there is another aspect of the Comparability Doctrine which must be considered. In principle, comparability is a policy of bringing government workers up to the level already attained by private sector workers. However, it can lead to a never ending spiral of wage increases. Such a situation appears to have developed in Japan where every August public workers receive wage increases to bring them to comparability with private sector workers while the following spring wage negotiations in the private sector give important attention to what increases the government workers received.[40] Careful study of the trend of the differential between the Federal government and the private sector during the years that the comparability principle has been applied is important in evaluating the possibility that such a situation will develop in this country. Moreover, an evaluation of the application of this principle is important from the viewpoint of the costs of the policy which the GAO has estimated to be $420 million a year for each one per cent increase in pay.[41]

The original decision to implement the comparability principle was a political one based on considerations of equity for Federal employees and improving the quality of workers the Federal government could obtain. The evaluation of its application is an economic problem. However, before considering this, a review of the literature on wage differentials relevant to this problem is valuable.

Footnotes

[1] CSC, *Federal Career Service*.

[2] U. S. Civil Service Commission, *Working for the USA*, BRE-37, Pamphlet 4 (Washington, D.C.: U. S. Government Printing Office, February 1973), p. 24.

[3] U. S. Civil Service Commission, *Blueprint for the Seventies Annual Report 1969* (Washington, D.C.: U. S. Government Printing Office, 1970), pp. 9-10 (Hereinafter referred to as *Annual Report 1969*.).

[4] CSC, *Working for the USA*, pp. 24-25.

[5] CSC, *Annual Report 1969*, p. 8.

[6] CSC, *Working for the USA*, pp. 25-26.

[7] CSC, *Annual Report 1969*, p. 8.

[8] CSC, *Working for the USA*, pp. 26-27.

[9] Thomas W. Gavett, "Comparability Wage Programs," *Monthly Labor Review*, XCIV (September 1971), p. 38.

[10] U. S. Civil Service Commission, *Challenge and Change Annual Report 1968* (Washington, D.C.: U. S. Government Printing Office, 1968), p. 27 (Hereinafter referred to as *Annual Report 1968*.).

[11] Gavett, "Comparability Wage Programs," p. 38.

[12] CSC, *Annual Report 1968*, p. 28.

[13] Gavett, "Compability Wage Programs," p. 40.

[14] CSC, *Annual Report 1969*, p. 7.

[15] *Ibid*.

[16] U. S. Civil Service Commission, Federal Personnel Manual System, *Federal Wage System*, FPM Supplement 532-1 (Washington, D.C.: U. S. Government Printing Office, January 1973), p. 1.

[17] CSC, *Annual Report 1968*, p. 27.

[18] L. Earl Lewis, "Federal Pay Comparability Procedures," *Monthly Labor Review*, XCII (February 1969), p. 10.

[19] Comptroller General of the United States, U. S. General Accounting Office, Report to Congress, *Improvements*

Needed in the Survey of Non-Federal Salaries Used as a Basis for Adjusting Federal Salaries, B-157266 (Washington, D.C.: U. S. General Accounting Office, May 11, 1973), p. 8 (Hereinafter referred to as *Survey of Non-Federal Salaries*.).

[20] *Ibid*., pp. 15-16.

[21] Lewis, "Federal Pay Comparability Procedures," p. 11.

[22] For further information on the "PATC" Survey, see Gavett, "Comparability Wage Programs," pp. 38-39, and Lewis, "Federal Pay Comparability Procedures," pp. 11-12.

[23] Section 502 quoted in Lewis, "Federal Pay Comparability Procedures," pp. 11-12.

[24] Comptroller General, *Survey of Non-Federal Salaries*, p. 5.

[25] *Ibid*., p. 35.

[26] *Ibid*., pp. 15-22.

[27] U. S. Congress, Senate, Committee on Post Office and Civil Service, *Wage Board Legislation*, hearing before Committee on Post Office and Civil Service, Senate, on S. 231, S. 315, S. 1086, S. 1288, and S. 1636, 92nd Congress, 1st sess., 1971, p. 145.

[28] *Ibid*., p. 146.

[29] *Ibid*., pp. 146-147.

[30] *Ibid*., p. 147.

[31] Lewis, "Federal Pay Comparability Procedures," p. 12.

[32] Gavett, "Comparability Wage Programs," pp. 39-40.

[33] Comptroller General, *Survey of Non-Federal Salaries*, p. 5.

[34] *Ibid*., pp. 11-12.

[35] *Ibid*., p. 10.

[36] *Ibid*., p. 6.

[37] Elmer B. Staats, "Weighing Comparability in Federal Pay," *Tax Foundation's Tax Review*, XXXIV (January 1973), p. 3.

[38] Gavett, "Comparability Wage Programs," p. 42.

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[39] *Ibid.*

[40] *Ibid.*

[41] Comptroller General, *Survey of Non-Federal Salaries*, p. 1.

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CHAPTER III

SURVEY OF THE LITERATURE

The existence, pattern, and determinants of wage differentials are subjects to which a large amount of research has been devoted. In the simplest sense, wage differentials may be defined as "differences in the wages received by various individuals or groups of individuals."[1] The existence of a wage differential between two types of labor is an indication that they are somehow different. Research in this area has dealt with determining whether wage differentials exist between certain specified types of labor and with theorizing on the reasons for their development. In addition, attempts are frequently made to study the movements of such differentials over time and to estimate the specific determinants of the differentials.

In order to study the wage differential between Federal government and private sector workers, a review of the theory of wage differentials is necessary. In addition, an examination of some of the empirical work done on this government wage differential is also valuable. The technique used in this thesis to estimate the Federal wage differential and its determinants is derived from research done on male-female differentials. Consequently, a review of the relevant articles is also important. The purpose of this chapter is to examine these subjects.

Theory of Wage Differentials

The concern among economists with a theory explaining the existence of wage differentials originated with Adam Smith. Smith maintained that in a perfectly free society the total sum of advantages associated with various jobs should be equal or tend to equality. However, he recognized that "Every man's interest would prompt him to seek the advantageous, and to shun the disadvantageous employment."[2] Consequently, he pointed out, wages for different jobs would not necessarily be equal. He maintained that five "circumstances" could lead to the existence of compensating differentials -- wage differentials which serve to equate the total sum of advantages and disadvantages among different jobs. These five "circumstances" were: the "agreeableness" of the job; the ease of learning it; the stability of employment associated with it; the "trust" associated with the job; and the probability of success in the job.[3] However, Smith recognized that mainly because of three types of policy, society is not perfectly free and, therefore, compensating differentials will not equalize the total sum of advantages and disadvantages associated with different jobs. These policies were: restrictions on competition in some jobs so that fewer people can enter the occupation than would be inclined to; artificial increases in the number of people in certain occupations to a number greater than would choose to enter them; and restrictions on the movement of labor and capital between places and types of employment.[4]

F. W. Taussig extended the theory of the existence of wage differentials begun by Adam Smith. Like Smith, Taussig recognized the existence of wage differentials which would "equalize the attractiveness of occupations."[5] In addition, he noted that a second type of wage differential may remain whether or not the occupations are equally attractive. Taussig attributed the existence of this second type of differential to the fact that choice between occupations is not perfectly free. Smith had also noted the existence of this type of differential but Taussig analyzed the implications of its existence in much greater detail. Because choice between occupations is not perfectly free, Taussig noted, equalizing differentials often will not occur as expected. Instead, the most attractive occupations will pay the highest wages. He attributed these differentials to the existence of non-competing groups, "non-competing in the sense that those born in a given grade or group usually remain there and do not compete with those in other groups."[6] Although Taussig recognized that these non-competing groups could arise from natural causes, he stressed the significance of social conditions in setting up barriers against the free movement of labor. He maintained that the three most important causes of non-competing groups were: the expense of education and training which therefore limits the number of people who are able to attain them mainly to those whose parents are well-to-do; the influence of the environment which causes people to remain in the same occupations as their parents; and differences in native abilities which limit the number of people who are capable of entering certain occupations.[7] Taussig believed that these factors led to the existence of five non-competing groups (day laborers; laborers with some more responsibility; skilled workmen; lower middle class, clerical type workers; and well-to-do professionals, managers), each of which was defined by both the nature of the jobs performed by its occupants and their wages and between which movement was nearly impossible.[8] These five groups corresponded very closely to social classes. In completing his analysis, Taussig maintained that if these barriers to free movement were removed, the only important factor remaining would be the "limitation of natural abilities" which would determine whether any remaining wage differentials merely equalized the attractiveness between occupations or represented extra compensation for some scarce ability. Taussig was unwilling to draw any firm conclusion concerning the existence of the latter differential but would only suggest that the elimination of all artificial barriers to entry into occupations is the "most important goal of society."[9] In his analysis, Taussig neglected the fact that there are other important forces which can lead to the existence of non-competing groups -- such as unions and various forms of discrimination -- and result in persistent wage differentials. On this point, Smith's analysis was more perceptive since he noted that any force which restricted the number of people who could enter an occupation would lead to a persistent wage differential but did not enumerate such forces.

Milton Friedman has offered a theoretical explanation of the existence of wage differentials which is essentially a further development of the arguments offered by Smith and Taussig. He maintains that the structure of wage rates observed at any time for several occupations results because of three sets of forces which produce these wage differentials between the occupations. The first set produces equalizing differentials. These are defined as Smith and Taussig defined them: differences in wage rates which serve to compensate for differences in the attractiveness of occupations. Friedman differs from Smith and Taussig, however, in providing a more complete analysis of the nature of these forces. Friedman includes in this category such factors as stability of employment, length of training, variability of returns, prestige, location, and others. Equalizing wage differentials then reflect differences in tastes with respect to these factors. The second set of factors which produce occupational wage differentials are barriers to free movement which create non-competing groups. Here, again, Friedman provides a much more complete analysis than Smith or Taussig. He deals specifically with five factors which could lead to non-competing groups: deliberate restrictions on entry, geographic immobility, differences in ability, socio-economic stratification, and color.[10]

Although this list is far more detailed than Taussig's, it is still incomplete. For example, it neglects sex as a factor leading to non-competing groups similar to those resulting from differences in color. Although Friedman's list does not specifically deal with the effect of government as an employer on the structure of wages, this could be considered as a "deliberate restriction on entry" similar to trade unions and licensing. In other words, the existence of government as an employer leads to non-competing groups of workers such that entrance into one group is deliberately restricted and workers in that group are protected from competition from workers outside it. This is the way in which Robert E. Hall treated the effect of government on wages in his test of the validity of Piore's dual theory of labor markets.[11]

The proponents of the Comparability Doctrine have treated government as a restrictive force setting up non-competing groups to the disadvantage of Federal workers. If government is not a restrictive force, there would be no need for intervention in the Federal wage-setting process to assure that comparable workers in both Federal and private sectors would receive equal pay for market forces would provide this result through the private wage-setting process. If the private wage exceeded the Federal wage for comparable workers and there was free movement between the two sectors, workers would leave the Federal government and employment would rise and wages fall in the private sector until wages were equal in both sectors. Similarly, if the Federal wage exceeded the private wage for comparable workers and there was free movement between the two sectors, workers would leave the private sector and employment would fall and wages rise until wages were equal in both sectors. However, this result would not necessarily hold if unemployment due to insufficient demand was present. Nevertheless, one reason for the institution of the Comparability Doctrine is the belief that the Federal government in setting up non-competing groups of workers has been able to act as a discriminating monopsonist. This condition seems to fall under the category of one of the types of discrimination Joan Robinson describes.

> A different type of discrimination may arise when men of the same efficiency are paid at different rates. This will occur if a separate bargain is made with each man, or with different groups of workers, and if the various men or groups differ in the minimum wage they are prepared to accept.[12]

This implies that Federal workers are willing to accept a lower reservation wage than private sector workers. The Comparability Doctrine seeks to pay all intramarginal workers the wage paid to the marginal worker with the highest reservation wage. If the discrimination was perfect so that each man was paid his minimum transfer earnings, the minimum necessary to retain his services, the result of this policy of imposing a wage equal to the highest minimum transfer earnings would be that

> the marginal and average cost of labour become equal to this wage, employment is unaltered (provided that the profit due to monopsony was a surplus above the normal

> profits necessary to maintain the employer in production), and the rent is transferred from the employer to the workers.[13]

The final type of wage differential Friedman considers is transitional differentials which result from incomplete adjustment to changes in supply or demand. This short-run differential is less clearly defined than the other types of differentials considered since what is considered a transitional difference "depends on our point of view."[14] This is the familiar question in economics of the difference between the short and the long-run. This type of differential offers another reason for the institution of the Comparability Doctrine: that the Federal differential reflects short-run deviations from long-run equilibrium. Such a differential may be related to monopsony power in the short-run.

Friedman's analysis summarizes the basic points of the so-called competitive hypothesis. The hypothesis, then, is that given completely free movement of labor, the total sum of the pecuniary and non-pecuniary returns to all occupations should be equal in the long-run. It is only the existence of restrictions which cause non-competing groups which prevents such long-run equilibrium. In this form, however, the competitive hypothesis is not a testable one. A testable hypothesis can be formed from this modified restatement of the competitive hypothesis: the pecuniary returns of workers of comparable productive characteristics should tend to equality.

The literature documenting empirical investigations of the validity of the competitive hypothesis is voluminous. Studies have been made of differentials by region, city-size, occupation, race, sex, union, and government. For this thesis, there are two points of interest in certain of these studies. The first is to examine the ways in which the government differential has been estimated. The second is to study techniques of estimation which would be valuable in estimating the government differential. Discussion will therefore be limited to such studies.

Estimations of the Government Differential

Unlike the other types of differentials mentioned above (regional, occupational, sex, union, race, etc.), the government differential has been largely neglected in empirical studies. When it has been estimated, it is usually only as part of a larger study. For example, in Hall's study of the dual labor market theory mentioned above, government was introduced as one of several restrictive forces which might lead to the existance of two separate, non-competing sectors of the labor market: a primary sector of good jobs, good conditions, and high wages; and a secondary sector of bad jobs, poor conditions, and low wages. According to the dual theory, wage differentials persist between the two sectors because certain restrictive institutions and discrimination interfere with the market forces which would tend to equalize wages and working conditions for the two sectors of the labor market.[15] In order to evaluate the validity of this theory, Hall made separate estimates of the impact of union membership, government employment, and occupation on the wages of white males, black males, white females, and black females. Since the dependent variable for each of these equations was the natural log of wages and his independent coefficients were dummy variables for union membership, government employment, and occupation, the coefficients obtained were then direct estimates of the proportional differentials associated with each of these institutions. In these equations, eight dummy variables were included for union membership by geographic location (four urban and four rural), four for type of government employment (state, local, post office, and other Federal), and eleven for occupation (the reference group was operatives). Hall controlled for health conditions, part-time work, age, education, interactions between age and education, and foreign or domestic residence at age sixteen by introducing these as dummy variables in determining the base wage. The four estimated equations revealed that a positive differential was associated with government employment in all but one case (state government employment for black females) but that its effect tended to be smallest for white males.

In order to estimate the impact of these institutions on the distribution of wages, Hall constructed frequency distributions of the wage differential received by each of the four race-sex groups both for the combined effect of union membership and government employment. These indicated that the two restrictive institutions did not apparently segment the labor force but did "seem to provide certain limited benefits to a fairly small proportion of the male labor force."[16]

Since Hall's concern was with testing the validity of the dual theory, his estimates of the government differentials for each of the four race-sex groups were of interest primarily for constructing the frequency distributions for this purpose. He gave little attention to variations in these differentials across race-sex groups and for the different levels of government. Furthermore, he did not consider whether these estimated differentials could be attributed solely to the effect of government as an employer or whether they also reflected variations in productivity among workers unaccounted for in the estimation of the base wage. Because Hall used the dummy variable technique of accounting for the effect of government employment which assumes that the other variables affect wages in government and non-government workers identically, Hall could not estimate the effects separately for the two types of workers and determine whether they were, in fact, different. Hall estimated these differentials at a point in time, using data from the 1967 Survey of Economic Opportunity, and thus did not consider any changes which may have occurred in these differentials over time as a result of the application of the Comparability Doctrine. These are all important questions which can be considered in this study concerned with the Federal government differentials only.

Stephen H. Perloff also examined a Federal wage differential as part of his study comparing municipal salaries with those paid in industry and the Federal government.[17] His was a small study limited to simple comparisons of the salaries paid in selected office clerical, data processing, and maintenance and custodial occupations in municipal governments in eleven large cities (Atlanta, Boston, Buffalo, Chicago, Houston, Kansas City, Missouri, Los Angeles, New Orleans, New York, Newark, and Philadelphia) with those in industry in the same cities and in the Federal government's nationwide General Schedule. Higher level computer occupations and maintenance and custodial occupations were omitted from the comparison with the Federal government because none were considered equivalent to those at a specific GS grade by the U. S. Civil Service. These comparisons were made on the basis of data from the Bureau of Labor Statistics. The comparison with Federal government pay was simply between municipal salary levels and equivalent levels at GS-1, GS-2, GS-3, and GS-4. The comparisons revealed that in the majority of cases the municipal salaries were at least slightly higher than the Federal and were often much higher. However, these comparisons ignored the ranges of salaries paid for individual jobs and differences in productive characteristics between workers. Furthermore, the study was limited to pay for the selected occupations in the selected cities and only made direct comparisons between municipal pay and private industry pay and between municipal pay and Federal government pay. Consequently, it could be expected to shed little light on the wage differential between Federal government and private sector workers.

The "PATC" Survey conducted by the Bureau of Labor Statistics (described in Chapter II) is directly concerned with this Federal wage differential and, as noted earlier, provides the empirical information used to determine the revision in Federal pay rates required to achieve comparability with private sector rates. Its short-comings with respect to coverage of relevant non-Federal workers and representation of jobs at certain work levels were noted in Chapter II. There is an additional problem associated with this survey which makes its results concerning the Federal wage differential questionable. The problem is in the basic technique used to conduct the survey, job matching. Although this technique is commonly used in both public and private wage surveys, it is basically a subjective process which introduces presently unmeasured non-sampling errors into the survey data.[18]

The job matching technique of collecting data for the "PATC" survey consists of a dialogue between a BLS data collector and an official from an establishment included in the coverage of the "PATC" survey in which certain establishment jobs are matched with similar jobs in the Federal government on the basis of a discussion of duties, responsibilities, and skill levels of the jobs. Although these data are given desk reviews and revisits are made to selected establishments in order to improve the quality of the data, it is affected in an unmeasured way by the abilities, knowledge, and cooperation of both the data collector and the respondent.[19] In its evaluation of the "PATC" survey, the General Accounting Office has conceded that the job matching technique is the proper one for conducting a survey of this size. However, the GAO has suggested that this technique should be improved and that these non-sampling errors should be considered in the determination of comparable pay rates for Federal workers. Accordingly, in order to improve the survey, the GAO recommended that certain of the job definitions should be clarified. In addition, the GAO has suggested that because certain of the surveyed jobs, those of a ranking-research type and attorney positions, involve personal qualifications, they should not be surveyed by the job matching technique. Finally, the GAO suggested that the BLS data collectors should receive additional training in order to assure greater consistency to the "PATC" survey data.[20]

Because of these and the other limitations of the "PATC" survey noted in the preceding chapter, it appears advisable for further study of the Federal wage differential to employ a different source of data than the "PATC" survey which is not subject to these shortcomings. It was for this reason this thesis uses census data to estimate this differential.

To avoid the problem of unmeasured non-sampling errors inherent in the "PATC" survey, a technique was needed to compare salaries in the two sectors (Federal and private) and to estimate the differential between them which did not rely on job-matching. This eliminated Perloff's method of examining the differential since it used the job-matching technique of comparison. Although Hall's method of estimating the government differentials did not use this technique, his method assumed that other independent variables affect government and non-government workers identically. This assumption should be tested. A technique is needed which permits a decomposition of the Federal-private differential into a part attributable to differences in productivity between workers in the two sectors and a part which remains between comparable workers. The estimation technique best suited to this purpose is that used by Ronald Oaxaca and Burton G. and Judith A. Malkiel in their separate studies of wage differentials between males and females. Since Oaxaca's technique is used in this thesis to estimate the Federal differential, his and the Malkiels' studies will be discussed in detail.

Oaxaca's Estimation Technique

In examining the persistent gap in earnings between men and women, Oaxaca's principal concern was to make quantitative estimates of the average effect of discrimination against women workers and of the determinants of the differential between men and women.[21] To estimate the effects of discrimination against women workers, Oaxaca defined a variant of Becker's generalized measure of discrimination as his discrimination coefficient. This is measured by the ratio of the difference between the actual ratio of male to female wages and the wage ratio that would exist in the absence of discrimination to the wage ratio in the absence of discrimination.[22]

He constructed a model of wage determination drawing heavily on the post-schooling models of human capital theory. Two basic wage equations were estimated for each of the four race-sex groups: white males, white females, black males, black females. One wage equation included only personal characteristics: variables for years of education and of experience (both linear and quadratic terms); dummy variables for health problems, part-time work, migration, marital status, size of urban area and region; linear and quadratic terms for the years since migration; and the number of children born to females as an indirect measure of the work experience they lost. The second type of wage equation included, in addition to the above personal characteristics terms, dummy variables for class of worker (private union membership, government employment, self employment) and industry and occupation of employment. Like Hall's study, the data used for estimating these equations came from the 1967 Survey of Economic Opportunity.

Using the results from these wage equations, Oaxaca then estimated the male/female wage ratio in the absence of discrimination under each of two alternative assumptions concerning the wage structure which would prevail for both sexes in the absence of discrimination. One assumption is that, in the absence of discrimination, both males and females would be paid according to the wage structure estimated for females. The other assumption is that, in the absence of discrimination, both males and females would be paid according to the wage structure estimated for males. Oaxaca recognized that the wages actually paid in the absence of discrimination would probably fall somewhere between the values predicted by these two assumptions and that by estimating the two values he would encounter the familiar index number problem.[23] Consequently, estimates of the discrimination coefficient were made in the form of a range of possible values rather than a single point estimate.

By controlling for differences in personal characteristics in his wage equations, Oaxaca was able to estimate that portion of the actual earnings gap between men and women which was attributable to differences in productivity (since these personal characteristics can be taken as proxies for productive characteristics) as well as that portion which results from discrimination against women workers. Each of these portions of the differential was measured in two ways, depending upon the assumption made with respect to the wage structure which would prevail for both sexes in the absence of discrimination. Assuming the female wage structure would hold for both, the portion of the differential attributable to personal differences would be measured by the differences in the mean values of the regressors for each of the sexes weighted by the estimated coefficients for the female wage structure. Under the alternative assumption, these differences would be weighted by the estimated male coefficients. Assuming the female wage structure would hold for both sexes, the differential due to discrimination would be measured by the differences in the estimated coefficients for males and females weighted by minus the mean values of the regressors for males. Under the alternative assumption, these differences are weighted by minus the mean values for the regressors for females.[24]

Oaxaca estimated the effects of discrimination against female workers under both assumptions with respect to wage structure for both equations. However, because in the full scale wage equations occupation was controlled for, the effect of discrimination was minimized since most of the influence of discriminatory occupational barriers was eliminated.[25] Consequently, the figures of interest in estimating the average effects of discrimination were those derived from the personal characteristics wage equations. Taking a single estimate of the discrimination coefficient at the midpoint of the range of values estimated under the two wage structures, Oaxaca found that 74 per cent of the white gross wage differential and 92 per cent of the black gross wage differential was due to discrimination.[26] For this thesis, his results with respect to the effect of government employment on each of the race-sex groups was of greater interest. Oaxaca found that each of the groups benefited but that white males benefited the least. This indicated that discrimination by race and by sex is less in government employment than elsewhere.[27] This result was for employment at any level of government. Whether this result also holds true for employment at the Federal level only will be investigated in this thesis.

Malkiels' Study of Sex Discrimination

Burton and Judith Malkiel's study of the male-female salary differential in professional employment also uses Oaxaca's technique to decompose the differential but has a narrower focus of attention and uses a more homogeneous set of data.[28] They examine the male-female salary differential for professional employees in a single corporation to determine how much of it was attributable to differences in personal characteristics and how much reflected discrimination against female workers. Because the data was for professional employees in a single corporation in which men and women were found doing the same range of jobs, it was possible to study this differential while holding the occupation constant. Other advantages of this data included the fact that information was available on actual years of experience (both work and non-work-related) and on various personal characteristics which are more direct proxies for productivity than were those used by Oaxaca (such as number and significance of the individual's publications and the critical nature of the individual's field of competence). This data was used to estimate two basic types of equations. One was a narrow post-schooling investment model including variables for schooling and experience and the other was a more expanded model which included productivity proxies. These expanded equations were then used to estimate the effect of discrimination employing Oaxaca's method of decomposing the gross differential. The estimated discrimination was less than that found in other studies reflecting the greater homogeneity of the data used. When these equations were re-estimated including a variable for job level, the discrimination effect disappeared. This led Malkiel and Malkiel to the conclusion that discrimination against females takes the form of assigning women to lower job levels than men of equal qualifications rather than paying different wages to men and women with equal qualifications at the same job levels.[29]

This conclusion concerning sex discrimination has important implications for the Comparability Doctrine. According to the Comparability Doctrine, Federal and private sector workers are to receive equal pay for the same level of work. However, discrimination may take the form of assigning Federal and private sector workers of equal characteristics to different levels of work. The job matching technique of comparing Federal and private salaries would

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not correct this situation. A differential unaccounted for by differences in characteristics between Federal and private sector workers, then, would be expected to persist.

Summary and Conclusions

Wage differentials have been a subject of theoretical and empirical interest to economists since Adam Smith. There are strong theoretical grounds for expecting the presence of a wage differential between Federal and private workers. This differential may be a transitional differential, a short-run deviation from long-run equilibrium of wages in the two sectors, or it may be a long-run differential resulting from government's setting up barriers to the free movement of labor leading to existence of non-competing groups of workers. However, there has been very little empirical work done on the government differential. The most extensive empirical study in this area is the "PATC" Survey, made for the purpose of determining Federal pay rates comparable to those paid in the private sector. Consequently, an empirical study employing data independent of the "PATC" Survey is needed. This is the purpose of this thesis. The technique used to estimate the differential is that employed by Oaxaca and Malkiel and Malkiel in their separate studies of sex discrimination. The model underlying the earnings and wage rate equations estimated for use in this decomposition of the differential will be described in Chapter IV.

Footnotes

[1] Carrie Glasser, *Wage Differentials* (New York: Columbia University Press, 1940), p. 13.

[2] Adam Smith, *An Enquiry into the Nature and Causes of the Wealth of Nations* (Edinburgh: University Press for Peter Brown and Thomas Nelson, 1827), p. 41.

[3] *Ibid.*

[4] *Ibid.*, p. 50.

[5] F. W. Taussig, *Principles of Economics*, Vol. II (3rd ed., rev.; New York: The Macmillan Co., 1927), p. 132.

[6] *Ibid.*, p. 141.

[7] *Ibid.*, pp. 136-138.

[8] *Ibid.*, pp. 141-144.

[9] *Ibid.*, p. 148.

[10] Milton Friedman, "The Supply of Factors of Production" in *Readings in Labor Market Analysis*, ed. by John F. Burton, Jr., *et. al.*, (New York: Holt, Rinehart and Winston, Inc., 1971), pp. 18-20.

[11] Robert E. Hall, "Prospects for Shifting the Phillips Curve through Manpower Policy," *Brookings Papers on Economic Activity* (3; 1971), pp. 682-684.

[12] Joan Robinson, *The Economics of Imperfect Competition* (2nd ed.; London: Macmillan and St. Martin's Press, 1969), p. 301.

[13] *Ibid.*

[14] Friedman, "Supply," p. 10.

[15] Hall, "Shifting the Phillips Curve," pp. 681-685.

[16] *Ibid.*, p. 689, p. 686.

[17] Stephen H. Perloff, "Comparing Municipal Salaries with Industry and Federal Pay," *Monthly Labor Review*, XCIV (October 1971), p. 46.

[18] U. S. General Accounting Office, Comptroller General of the United States, *Report to Congress, Improvements Needed in the Survey of Non-Federal Salaries Used as a Basis for Adjusting Federal Salaries*, B-167266 (Washington, D.C.:

U. S. General Accounting Office, May 11, 1973), p. 3.

[19] *Ibid*., pp. 38-41.

[20] *Ibid*., pp. 53-54.

[21] Ronald Oaxaca, "Male-Female Wage Differentials in Urban Labor Markets," *International Economic Review*, XIV (October 1973), p. 693.

[22] Ronald Oaxaca, "Sex Discrimination in Wages" in *Discrimination in Labor Markets* ed. by Orley Ashenfelter and Albert Rees (Princeton, New Jersey: Princeton University Press, 1973), p. 125.

[23] *Ibid*., p. 143.

[24] The derivation of these measures is given in Chapter IV as they apply in the case of decomposing the gross Federal-private earnings (wage) differential.

[25] Ronald L. Oaxaca, "Male-Female Wage Differentials in Urban Markets," Princeton University, Industrial Relations Section, Working Paper no. 23, 1971, p. 30. (Mimeographed).

[26] Oaxaca, "Sex Discrimination," p. 147.

[27] *Ibid*., p. 148.

[28] Burton G. Malkiel and Judith A. Malkiel, "Male-Female Pay Differentials in Professional Employment," *American Economic Review*, LXIII (September 1973), p. 693.

[29] *Ibid*., p. 704.

CHAPTER IV

THEORETICAL MODEL AND EMPIRICAL FORMULATION

In studying earnings and wage differentials between Federal and private sector workers, it is necessary to estimate earnings and wage structures. These models of earnings and wage rate determination are developed from the post-schooling investment models of human capital theory.

In this chapter, the exact specifications of the equations to be estimated are developed. The data and variables to be used in these estimations are described in detail. The technique to be used to decompose the earnings and wage rate differentials is also considered.

Post-Schooling Investment Model

According to the human capital model of personal income distribution developed by Becker, Mincer, and Becker and Chiswick,[1] individuals attempt to maximize their welfare by investing in human capital in the form of schooling, on-the-job training, and other investments, such as health and migration. The relation between earnings and investments in human capital can be defined as

$$(1) \quad E_i = X_i + \sum_{j=1}^{n_i} r_j C_{ij}$$

where

E_i = an individual's gross earnings after he has completed his investments in human capital

X_i = his earnings without making any investments in human capital

C_{ij} = the amount paid by the ith individual on the jth investment

r_j = the rate of return on that investment

Unfortunately, information on the amounts individuals spend on human capital investments, especially non-schooling investments, is ofteh unavailable. However, Becker and Chiswick have shown that this model can still refer to post-schooling investments by expressing the costs of these investments in terms of the time spent. The device they use is to express the cost of the jth year of investment as the fraction, k_{ij}, of earnings the ith individual would receive if he made no investment in human capital that year. This fraction is the ratio of investment costs to earnings for that "year." Mincer has suggested that k_{ij} can be seen as the "fraction of time (or a 'time equivalent,' if investment costs include direct outlays as well as time costs) the worker devotes to the improvement of his earning power."[2] Using this, equation (1) can be re-written as

$$(2)\quad E_i = X_i[1 + k_{i1}r_1]\,[1 + k_{i2}r_2]\,.\,.\,.\,[1 + k_{in_i}r_{n_i}]$$

where n_i is the length of the ith individual's investment period. Becker and Chiswick then demonstrate that by introducing a multiplicative residual term, e^{u_i}, to account for the effects on earnings of luck and other factors and taking the logarithmic transformation of this relationship, (2) can be re-written as

$$(3)\quad \ln E_i = \ln X_i + \sum_{j=1}^{n_i} \ln\,[1 + k_{ij}r_j] + u_i.$$

The term in $[1 + k_{ij}r_j]$ in equation (3) can be shown to equal the first two terms of the Taylor series expansion of the polynomial function

$$f(r_j) = e^{k_{ij}r_j}$$

evaluated at $r_j = 0$. The generalized Taylor series formula for the expansion of the nth degree polynomial $f(x)$ about the point x_0 is[3]

$$f(x) = f(x_0) + \frac{f'(x_0)}{1!}(x-x_0) + \frac{f''(x_0)}{2!}(x-x_0)^2 + \dots$$

$$+ \frac{f^{(n)}(x_0)}{n!}(x-x_0)^n$$

For this function, the expansion is

$$f(r_j) = 1 + k_{ij}r_j.$$

Substituting $e^{k_{ij}r_j}$ for the term $[1 + k_{ij}r_j]$ in equation (3) results in

$$(4) \quad \ln E_i = \ln X_i + \sum_{j=1}^{n_i} k_{ij}r_j + u_i.$$

X_i, the income the ith individual would receive if he made no investments in human capital, can be defined according to Becker and Chiswick as

$$X_i = \overline{X}\,(1 + \alpha_i)$$

where α_i is a measure of the personal characteristics of the ith individual which are independent of the amount of human capital invested in him. Then, setting $\ln \overline{X} = a$ and defining a new residual, $v_i = \ln(1 + \alpha_i) + u_i$ (under the assumption that there is no relation between an individual's unskilled personal characteristics and the effect of such factors as luck on his earnings), equation (4) becomes

$$(5)\quad \ln E_i = a + \sum_{j=1}^{n_i} k_{ij} r_j + v_i .$$

This model can be expanded to estimate separately the effects of different investments in human capital. Under the usual assumption that $k_{ij} = 1$ during the school years while $k_{ij} \neq 1$ for post-school investments, the expanded model becomes

$$(6)\quad \ln E_i = a + rs + \sum_{j=s+1}^{n_i} k_{ij} r_j + v_i$$

where s = the number of years spent in school

The model is restricted to the effects of schooling and on-the-job training on the earnings of individuals because little is known about the fraction of time devoted to other types of human capital investments (such as health and migration).

However, the model can be better specified by expressing investments in on-the-job training as linearly declining. It has been shown that this will result in the observed parabolic earnings profiles in logs.[4] Following Mincer, k_{ij} can be defined as

$$(7)\quad k_{ij} = k_0 - (k_0/T)\, j_i$$

where

k_0 = the fraction of time or time equivalent devoted to on-the-job training during the first period of work experience following formal schooling
T = the year at which investment in on-the-job training stops
j_i = the number of years since the end of formal schooling (that is, the work experience) of the ith individual.

Such a formulation has been used by Mincer, Johnson, Oaxaca, and Malkiel and Malkiel.[5] It leads to the following form of the post-schooling investment model

$$(8)\ \ln E_i = a + r_{1i}s + r_{2i}k_0j_i - r_{2i}(k_0/2T)j_i^2 + v_i$$

which allows for different rates of return for schooling and on-the-job training. Included in the residual, v_i, are the effects of natural ability and luck.

This post-schooling investment model is written in terms of a single individual at a specific point in his life cycle. It is assumed that this model applies to any individual, whether he is employed in the private sector or by the Federal government. In other words, an individual's earnings are assumed to be functionally determined by his investments in human capital, regardless of his class of employment.[6] However, in making quantitative estimates of this model, there is no longitudinal data available. Instead, cross-sectional data are used in estimation. Consequently, the model must be modified to account for the different characteristics of these data.

Empirical Formulation

The data used to estimate the post-schooling investment model specified above are cross-sectional data from the Public Use Samples of the 1960 and 1970 censuses on many different individuals of different ages. Because the model specified in equation (8) is written in terms of a single individual at a specific point in his life cycle, it is necessary to expand this model to include various other factors which are sources of variation among individuals; such as, personal characteristics, locational characteristics, etc. This is the kind of formulation Oaxaca has employed. In broad terms, this relation can be expressed as

$$(9) \quad \ln E_i = f(X_i, Z_i, O_i, L_i)$$

where

E_i = yearly earnings of the ith individual
X_i = a vector of human capital investments of the ith individual
Z_i = a vector of personal characteristics of the ith individual
O_i = a vector of occupational characteristics of the ith individual
L_i = a vector of locational characteristics of the ith individual.

Equation (9) is an expansion of the model contained in equation (5) reflecting the theoretical models of Becker, Mincer, and Becker and Chiswick. Oaxaca's model differs from these in being written in terms of hourly wage rates instead of annual earnings. This ignores the effect of differences in stability of employment among individuals as reflected in the influence of differences in the number of weeks worked during the year on annual earnings. Em-

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ploying this type of formulation, the relation in equation (9) can be expressed as

(10) $\ln W_i = g(X_i, Z_i, O_i, L_i)$

where

W_i = the hourly wage rate of the ith individual
X_i, Z_i, O_i, and L_i are defined as above.

An important non-pecuniary benefit allegedly associated with government employment is its stability compared to employment in the private sector. A measure of differences in the stability of employment between the two sectors is the difference in the number of weeks worked during the year. Consequently, differences in earnings between Federal and private sector workers reflect differences in this non-pecuniary benefit while differences in hourly wage rates do not. Both are examined in this thesis.

Before considering the specification of the variables included in the earnings and wage rate equations of this study, a detailed description of the data used for these estimations is valuable.

Data

In order to estimate the earnings and wage rate structures for Federal and private sector workers, two sources of data are employed. The two are subsamples drawn from the summary tapes of the Public Use Samples of the 1960 and 1970 censuses. The primary sample size of the Public Use Samples is one in a hundred, one sample unit for every hundred units in the population. The 1960 Public Use Sample is a 1 per cent sample of the basic records of the 1960 census organized by states and consists of thirty tapes.[7] For this study, a subsample contained on one tape was obtained. This subsample consists of selected housing and personal information on all civilian members of the labor force eighteen years of age and older who were residents of Delaware, Maryland, Virginia, or the District of Columbia. The subsample was restricted to these individuals in order to obtain a sufficient number of Federal workers and comparable private sector workers in approximately one labor market. The information contained in the 1960 Public Use Sample is largely compatible with that in the 1970 Public Use Sample.

There are limitations associated with the use of this subsample which also apply to the 1970 subsample since it was selected in the same way. The problem is with the occupational composition of Federal workers in the District of Columbia and nearby states. In particular, it is possible that the high percentage of professional Federal workers in the District of Columbia makes the representativeness of the tape questionable. Since most professional Federal workers are paid under the General Schedule, the problem is evident in an examination of the percentages of Federal employees by pay system in the United States and in the District of Columbia as of December 31, 1970:[8]

	United States	D.C. Metropolitan Area
General Schedule	47	72
Wage System	20	12
Postal Field	28	5
Other	5	11

However, when these percentages are examined for Federal workers in Delaware, Maryland, Virginia, and the District of Columbia (the area covered by the subsample), the differences from the percentages for United States as a whole are somewhat smaller:[9]

General Schedule	67
Wage System	17
Postal Field	8
Other	8

Limiting the subsample to this geographic area means that it is roughly equivalent to a single labor market for most workers. However, it is possible that the relevant labor market for some of the private sector professional workers who are substitutes for the professional Federal workers (who are present in such high percentages in this geographic area) is the entire country instead of this geographic area only. It does not appear probable that a sufficient number of workers are of this type to affect the equations estimated with this data. However, equations are estimated on the subsample with the professional, technical, and kindred workers eliminated in order to verify this assumption. These are examined in Chapter V and Chapter VI.

The subsample of the 1960 Public Use Sample used in this study contains information on a total of 30,179 individuals. In all estimations, individuals working without pay are excluded through a variable providing information on class of worker. Employees of state and local government are excluded from all the estimations through the three-digit industry classification variable which identifies state public administration workers and local public administration workers. After these exclusions, there are 29,349 individuals. These are divided into Federal workers and private sector workers through the industry classification of Federal public administration workers and postal service workers. This industry variable does not permit a complete subdivision of workers into the three separate levels of government and the private sector because an unidentifiable number of government workers are classified as workers in private industry categories. Examples include employees of the U. S. Crop Insurance Corporation, the U. S. Housing Administration, the Federal Deposit Insurance Corporation, and the Federal Saving and Loan Insurance Corporation which are included with private companies in the insurance category and the U. S. Capital Housing Authority which is classified under the real estate category.[10] However, it is believed that the industry variable does provide a good approximation to the desired classification of workers. Because the 1970 census data classify workers at each separate level of government, whatever bias results from the use of the industry variable for this division of the data can be determined.

The 1960 data used in the estimations are categorized further in Table 2.

Table 2

1960 Data Categorized by Sector, Race and Sex

	Private Workers		Federal Workers	
Total	26,429	100.0[a]	2,920	100.0[a]
White	20,544	77.7	2,253	77.2
Non-White	5,885	22.3	667	22.8
Male	17,260	65.4	1,840	63.0
Female	9,169	34.7	1,080	37.0
White Male	13,760	52.1	1,407	48.2
White Female	6,784	25.7	846	29.0
Non-White Male	3,500	13.2	433	14.8
Non-White Female	2,385	9.0	234	8.0

[a] Subtotals may not sum to 100.0 due to rounding.

Two census forms, differing in certain questions, were used in the 1970 census: one for a 15 per cent sample and one for a 5 per cent sample. One in a hundred samples were created separately for each of these samples so that the one in a hundred sample contains one-fifteenth of the basic records of the 15 per cent sample or one fifth of the records of the 5 per cent sample. Three one in a hundred samples were drawn from each of these samples. The three are the state, county group, and geographic division one in a hundred samples. Like the 1960 data, each contains information in two segments: a household segment and a person segment. The three differ in the type of geographical information contained in the housing segment.[11]

For this study, a subsample of selected housing and personal information on all civilian members of the labor force eighteen years of age and older who were residents of Delaware, Maryland, Virginia, or the District of Columbia was drawn from the 5 per cent state Public Use Sample. The 5 per cent sample size was chosen because of the information it contained on disability. The state one in a hundred sample was chosen because it was most compatible with the 1960 data. The subsample used in this study contains information on 38,111 individuals. In all the estimations, individuals working without pay are excluded again using the class of worker variable. As discussed above, state and local government workers can be excluded from the remaining individuals using the three-digit industry classification variable. Unlike the 1960 data, the 1970 data contains an industry classification "Public Administration Allocated." Allocations are made in editing census data by imputing likely values to missing or inconsistent values. This editing process had a greater impact on the 1970 census than on the 1960 census.[12] In all subdivisions of the 1970 data using the industry classification method, individuals in this category are allowed to fall under private industry so that the data are directly comparable with the 1960 data. This procedure is followed in the belief that individuals in the 1960 data who would have been classified under "Public Administration Allocated" if that category had existed, are classified instead under some private industry category or the "Industry Not Reported" category (which is included under private industry). Therefore, under the industry classification method, only those individuals who are clearly employed by the Federal government are used in estimations on Federal workers. Using the industry classification method, the remaining 1970 data contain 37,049 individuals. Alternatively, state and local government workers can be excluded from the subsample using the work class variable which classifies each worker according to type of employer. Using this method, the remaining data contain 33,523 individuals. Estimations are made on the 1970 data using both methods of dividing the subsample. The data used in the estimations are categorized in Table 3.

Specification of the Variables

Although the 1960 and 1970 Public Use Samples are largely compatible, there are differences in the variables included on each tape and in the specification of some of the variables found on both tapes. Consequently, some of the variables included in equations estimated are defined differently for the 1960 data than for the 1970 data. Both earnings and wage rate equations are estimated for each of the subsamples. They are estimated for all Federal and for all private workers in each of the subsamples as well as for the following eight race-sex divisions of each of the two groups of workers: whites, non-whites, males,

Table 3

1970 Data Categorized by Sector, Race, and Sex

	Private Workers				Federal Workers			
Total	32,941[a]	100.0[b]	28,140[c]	100.0[b]	4,108[a]	100.0[b]	5,383[c]	100.0[b]
White	25,705	78.1	22,407	79.[illegible]	3,156	76.9	3,942	73.2
Non-White	7,236	22.0	5,733	20.4	952	23.2	1,441	26.8
Male	19,491	59.2	17,377	61.8	2,538	61.8	3,325	61.8
Female	13,450	40.8	10,763	38.2	1,570	38.2	2,058	38.2
White Male	15,611	47.4	14,178	50.4	2,052	50.0	2,559	47.6
White Female	10,094	30.6	8,229	29.2	1,104	26.9	1,383	25.7
Non-White Male	3,380	11.8	3,199	11.4	486	11.8	766	14.2
Non-White Female	3,356	10.2	2,534	9.0	466	11.3	675	12.5

[a] These are obtained when the subsample is divided using the industry classification method.

[b] Subtotals may not sum to 100.0 due to rounding.

[c] These are obtained when the subsample is divided using the work class method.

females, white males, white females, non-white males, and non-white females. In each case, two basic types of equations are estimated: one in which only personal characteristics and location are included as explanatory variables and the other in which occupational variables are also included.

Earnings Regressions

In both sets of equations estimating the earnings structure, the dependent variable is the natural logarithm of annual earnings (where earnings is the "sum of wage or salary income and net self-employment income"[13]). Earnings are reported in the 1960 Public Use Samples in hundred dollar ranges through an income of $999, in thousand dollar ranges from an income of $1,000 to an income of $24,999, and as an open-end interval for incomes of $25,000 and over. For estimation purposes, earnings are defined at the midpoint of thousand dollar intervals through $24,999: that is, $500, $1500, $2500, $3500, etc. An average value for earnings in the open-end interval is obtained by a method in which a Pareto curve is fitted to the data. The formula for this average value is

$$\overline{X} = X\left(\frac{V}{V-1}\right) \qquad V = \frac{c-d}{b-a}$$

where

X = the lower limit of the open-end interval
V = the slope of the income curve
a = the logarithm of the lower limit of the interval preceding the open-end interval

b = the logarithm of the lower limit of the open-end interval
c = the logarithm of the sum of the frequencies in the open-end interval and the interval preceding it
d = the logarithm of the frequencies in the open-end interval.[14]

The frequencies used in this computation are those for the entire 1960 tape including individuals working without pay and state and local government workers. The average value for 1960 computed in this fashion is:

$$\bar{X} = \$65,136.74 \qquad V = 1.6229 = \frac{\ln(78)-\ln(73)}{\ln(25,000)-\ln(24,000)}$$

Earnings in the 1970 Public Use Sample are reported in hundred dollar intervals through an income of $49,999 and as an open-end interval for incomes of $50,000 and over. For estimation purposes, earnings are defined at the mid-point of hundred dollar intervals through $49,999: that is, $50, $150, $250, $350, etc. An average value for earnings in the open-end interval is obtained through the Pareto formula defined above. The frequencies used in this computation are again those for the entire 1970 tape including individuals working without pay and state and local government workers. The average value for 1970 computed in this fashion is

$$\bar{X} = \$82,480.75 \qquad V = 2.5389 = \frac{\ln(60)-\ln(57)}{\ln(50,000)-\ln(49,000)}$$

In both 1960 and 1970, the dependent variable in both sets of earnings regressions for individuals who reported no income is set equal to one.

This value for annual earnings does not include the value of expenditures on fringe benefits in either the

Federal or private sectors. It was noted in Chapter II that fringe benefits form an increasingly important part of employee compensation and that since 1962 they have grown faster in the Federal than in the private sector. Consequently, to determine whether workers in the two sectors receive comparable pay, some consideration should be given to fringe benefits. There is a great deal of evidence pointing to a positive relationship between fringe benefits and wage rates. When turnover costs and union membership were held constant, it was found that

> (1) wage supplements generally vary positively with money earnings independently of the other factors considered, (2) variations in wage supplement expenditures can be explained largely in terms of variations in money earnings.[15]

Consequently, if it is accepted that the proper basis for comparison between Federal and private workers is compensation, earnings plus fringe benefits, rather than earnings alone, then it must be recognized that "relative money wage differentials progressively understate differentials in compensation."[16] However, because there is no information on the value of fringe benefits contained in the census data, estimates of the Federal-private differential are made on the basis of the earnings data with the realization that these differentials are downward biased estimates of the differential in compensation.

Personal Characteristics Earnings Regressions

In the personal characteristics earnings regressions, three variables are included to account for the effects of different investments in human capital. In accordance with the post-schooling investment models of Becker, Mincer, and Becker and Chiswick discussed above, the specification admits two types of investments: education which enters as a linear term and experience which appears as a quadratic variable to reflect an expected declining rate of return to on-the-job training. Because the Public Use Samples provide no information on actual experience, an estimate of potential work experience is made for each individual on the basis of his age and education. How closely this approximates actual years of experience depends upon the strength of the individual's attachment to the labor force. These variables are defined as follows:

ED = number of years of school completed
X = age minus years of school completed minus five
XSQ = the square of potential work experience defined above.

In order to control for other sources of variation among individuals, a number of personal characteristics variables are included. The specific variables are:

RACE = 1 if non-white (Negro, American Indian, Japanese, Chinese, Fillipino, other--including Aleut, Eskimo, Hawaiian, and Korean)
= 0 otherwise
SEX = 1 if female
= 0 otherwise

The reference group, then, is white males. These variables principally reflect the effects of discrimination against non-whites and females. Differences in productivity between the races and sexes are reflected mainly through the other personal characteristics variables: education, experience variables, marital status variables, etc.

Several dummy variables for marital status are included: spouse present, spouse absent, widowed, and divorced-separated. The reference group is single, never-married individuals. Bowen and Finnegan developed the rationale for the use of these variables.[17] They argue that for prime-age males, marital status serves primarily as a proxy for certain personality traits and health characteristics which facilitate success in work and secondarily as a measure of family responsibility and thus taste for work.[18] This argument implies that marriage with spouse present will have a favorable effect on men's earnings. The effects of the other marital categories are expected to be less pronounced than those of the spouse present category. On the other hand, marriage with spouse present is expected to have an unfavorable effect on women's earnings. Here employers tend to regard married women as prone to absenteeism and justify paying lower salaries on the additional grounds that married women are only a source of supplementary income to the family.

Because the data for 1960 and for 1970 pertains to the South Atlantic Census Region, it is unnecessary to introduce dummy variables for region to control for differences in the cost of living among the regions in order to examine real differentials rather than money differentials. However, it is necessary to include a location variable to control for differences in cost of living, job opportunities, and other pecuniary and non-pecuniary factors associated with urban areas. Several dummy variables distinguishing different urban areas by population size would be desirable, but this information is unavailable in the data used. Three alternative possible variables are available:

> urban residence--residence within an urbanized area or in places of 2,500 or more outside urbanized areas (the reference group is rural residence);
>
> metropolitan residence--residence within a standard metropolitan statistical area (the reference group is residence outside SMSA's);
>
> central city residence--residence within the urban part of the central city of an SMSA (the reference group is residence outside the central city).

Each of these variables is expected to have a positive sign.

Data for each of these variables are unavailable for residents of Delaware because this state violates the criterion that at least 250,000 individuals live in one of the identified categories. Because the number of observations from the state of Delaware is small relative to the total size of the samples, it is not expected that this adversely affects estimations using a location variable.

The concept of an urbanized area has several advantages over that of an SMSA in measuring the effects of large population size on earnings. The differences between the two concepts are that an urbanized area excludes rural sections of counties comprising SMSA's and places which are separated from the densely population fringe surrounding a central city by rural territory. In addition, unlike SMSA's, whose borders are permanent, urbanized areas are defined according to the population distribution at the time of the census.[19] When only one variable is used to measure urban size effects on cost of living and other pecuniary and non-pecuniary factors, the distinction between urban and rural residence appears more meaningful than that between central city and non-central city residence.

In order to verify these expectations concerning the locational variables, equations are estimated using each. In the majority of cases, these suppositions are confirmed: R^2 and F statistics are greatest for equations estimated with the urban variable; the sign is correct for the urban variable; and the significance level is greater for this variable than for either of the other location variables.

Two additional personal characteristics variables are included in certain of the equations estimated. One is a variable included in certain of the equations estimated for females, white females, and non-white females which is specified:

BABYB = the number of children born

The presence of children has an important effect on the labor force participation of women. In their study of the labor force participation rates of married women, Bowen and Finnegan have shown that these rates differ according to the ages of children present. Women with children under age six only had the lowest participation rates of married women studied in urban areas after adjusting for the effects of color, age, schooling, other family income, and the employment status of the husband. Married women with no children under age eighteen had the highest adjusted participation rates of all the married women studied. These adjusted participation rates were quite different for married Negro women, however. Their rates were higher than those for all married women for every category but the differences were most obvious among women with only children under age six and those whose youngest child was between six and thirteen years of age.[20] Consequently, it is expected that women with very young children will often leave the labor force to care for them but may frequently return as their children grow older. However, this tendency to leave the labor force in order to care for their young children is less strong for Negro women. The rationale for the inclusion of a variable measuring the number of children born to the female was developed by Oaxaca as a reflection of the "cost of lost experience due to child care, including the costs from the depreciation of skills during the periods of absence from the labor force."[21]

The second variable included in certain equations is a dummy variable for health status. This is defined:

DISAB = 1 if health problems limit the individual's ability to work
= 0 otherwise

This information is only available in the 1970 data. It is clear that there is a relationship between an individual's health status and his labor force participation. However, Bowen and Finnegan found that in the case of prime-age males "there is a powerful interaction among health, schooling, and labor force participation."[22] Consequently, while this variable is expected to have a negative effect on earnings, it is recognized that there are interactions between education, experience, and health conditions. Differences in the effect of this variable with respect to race are expected to reflect such interactions as well as differences in the health status of the races. Furthermore, it is expected that the effect of this variable will differ with respect to sex. This is an indication of the greater substitutability of work in the home for females than for males as well as interactions between education, experience, and health conditions and differences in the health status of the sexes. Consequently, it is expected that this variable has a negative effect which is smaller in absolute size for females than for males.

Full Earnings Regressions

In the full earnings regressions, dummy variables are included for the U. S. Census two-digit occupations as well as the variables included in the personal characteristics earnings regressions. In the original design of this set of variables, clerical workers were the reference group and separate dummy variables were to be included for professional and technical workers, managers, sales workers, craftsmen, operatives (including transport), laborers, farmers and farm managers, service workers, and private household workers. However, there are insufficient observations in several of these cells to permit estimation. Consequently, the occupation variables are limited to an estimable number, the included variables varying according to the particular subsample of data being estimated.

Although these occupational variables are expected to add to the explanatory power of the estimated earnings structure, their inclusion for the purpose of this study is questionable for several reasons. According to the Comparability Doctrine, Federal pay rates are to be comparable to private pay rates at the same level of work. The same occupation in the private sector may exist at more than one level of work in the Federal sector. Consequently, the effect this occupational variable would measure is unclear. Furthermore, if the policy goal of achieving equity between Federal workers and their equals in the private sector has been achieved, then workers with comparable productive characteristics should receive comparable pay without controlling for occupation. The relevant earnings structure to examine for this purpose is the estimated personal characteristics equations. Nevertheless, the full earnings equations are also estimated in order to examine the question of whether Federal and private workers of roughly equal characteristics receive the same pay for the same broad occupational categories.

Wage Regressions

In both sets of equations estimating the wage structure, the dependent variable is the natural logarithm of the hourly wage rate. Because the hourly wage rate is not directly available in the census data, an estimate is made on the basis of the annual earnings (as defined above for the earnings regressions), the weeks worked for the year preceding the census, and the hours worked during the census reference week. The hourly wage rate is estimated, then, by the relation

$$\text{wage rate} = \begin{array}{l}\text{annual}\\ \text{earnings}\end{array} \cdot \begin{array}{l}\text{1/weeks worked}\\ \text{for the year}\\ \text{preceding the}\\ \text{census}\end{array} \cdot \begin{array}{l}\text{1/hours worked}\\ \text{during the}\\ \text{census reference week}\end{array}$$

In both censuses, weeks worked are reported in intervals. For estimation purposes, weeks worked are defined at the mid-points of these intervals: for the interval 13 weeks or less, weeks worked are set equal to 6.5; for the interval 14-26 weeks, weeks worked are set equal to 20; for the interval 27-39 weeks, weeks worked are set equal to 33; for the interval 40-47 weeks, weeks worked are set equal to 43.5; for the interval 48-49 weeks, weeks worked are set equal to 48.5; for the interval 50-52 weeks, weeks worked are set equal to 51. Hours worked during the reference week are also reported in intervals in both censuses. For estimation purposes, hours worked are defined at the mid-points of all but the last interval: for the interval 1-14 hours, hours are set equal to 7; for the interval 15-29 hours, hours are set equal to 22; for the interval 30-

34 hours, hours are set equal to 32; for the reported 40 hours, hours are set equal to 40; for the interval 41-48 hours, hours are set equal to 44.5; for the interval 49-59 hours, hours are set equal to 54. The final interval is an open-end interval of 60 or more hours. The average value for hours here is obtained by the same method used to obtain the average value for earnings in the open-end interval, by fitting a Pareto curve to the data. The frequencies used in the computations for each tape are those for the entire tape, including individuals working without pay and state and local government workers. Therefore, the average value for hours in the open-end interval, $\bar{H}$, is computed using the formula

$$\bar{H} = H\frac{Z}{(Z-1)} \qquad Z = \frac{c-d}{b-a}$$

where

H = the lower limit of the open-end interval
Z = the slope of the curve fitted to the data
a = the logarithm of the lower limit of the interval preceding the open-end interval
b = the logarithm of the lower limit of the open-end interval
c = the logarithm of the sum of the frequencies in the open-end interval and the interval preceding it
d = the logarithm of the frequencies in the open-end interval.

The average value for 1960 computed in this fashion is

$$\bar{H} = 84.161 \qquad \text{where } Z = 3.4833 = \frac{\ln(4252) - \ln(2100)}{\ln(60) - \ln(49)}$$

The average value for 1970 computed in this fashion is

$$\bar{H} = 80.899 \qquad \text{where } Z = 3.8709 = \frac{\ln(4343) - \ln(1983)}{\ln(60) - \ln(49)}$$

The specification of the control variables for the personal characteristics and the full wage regressions is the same as that for the earnings regressions. These equations are estimated for all Federal and for all private workers as well as for each of the eight race-sex subdivisions (whites, non-whites, males, females, white males, white females, non-white males, non-white females) of Federal and of private workers.

Structural Comparisons

Before specifying the exact technique used to estimate the earnings and wage rate differentials between Federal and private sector workers and to decompose these differentials into their component parts, it is necessary to consider the hypothesis that the earnings (wage rates) of Federal workers and private sector workers are generated by the same structure. In order to test this hypothesis, personal characteristics and full-scale earnings and wage equations are estimated for all Federal workers, all private workers, and all workers in the subsample (except state and local government workers and individuals working without pay). These estimations are made on the 1960 data and the 1970 data using both the industry classification and the work class methods to subdivide it. These results are employed to perform a Chow test of the equality of earnings and wage rate structures for Federal and private workers.[23] The test statistic formed is

$$\frac{(SSE_T - SSE_P - SSE_F)/k}{(SSE_P + SSE_F)/(n + m - 2k)} \sim F_{k,\,n+m-2k}$$

where

T = total of private and Federal workers combined
P = private workers
F = Federal workers
k = number of independent variables plus one
n = number of private workers
m = number of Federal workers

It is expected that the earnings and wage rate structures estimated with personal characteristics only are significantly different in 1960 and 1970 for Federal and private workers. The results from the application of the Chow test, contained in Table 8, confirm that the structures are significantly different at the 5 per cent level. However, it is possible that when differences in occupational structure between the two sectors are controlled for in the full regressions, the earnings and wage rate structures will no longer be significantly different. The test statistics formed from the application of the Chow test to the full earnings and wage rate equations, found also in Table 8, confirm that the earnings and wage rate structures are still significantly different for Federal and private workers in both 1960 and 1970 at the 5 per cent level. The earnings equations from which these statistics are formed are found in Tables 4 and 5. The wage equations are presented in Tables 6 and 7.

Table 4

Overall Personal Characteristics Earnings Equations[a]

Dependent Variable: ln E	All Workers	1960 Federal	Private
Constant	5.9379 (73.5584)	5.6534 (45.9316)	6.2386 (76.0156)
Education	0.0458 (10.6941)	0.0721 (9.5657)	0.0226 (4.8043)
Experience	0.0447 (14.2542)	0.0626 (11 3560)	0.0364 (10.7040)
Experience Squared	-0.0011 (-20.1046)	-0.0010 (-8.6577)	-0.0010 (-17.3244)
Race	-0.2754 (-7.8053)	-0.3146 (-5.8060)	-0.3056 (-7.9437)
Sex	-0.4384 (-14.3354)	-0.6132 (-12.8491)	-0.4084 (-12.2743)
Spouse Present	0.1836 (4.7602)	-0.0250 (-0.4032)	0.2307 (5.2023)
Spouse Absent	-0.0618 (-0.6256)	-0.1863 (-1.0838)	-0.0121 (-0.1143)
Widowed	0.2382 (3.0340)	0.1259 (0.9817)	0.2828 (3.3317)
Divorced, Separated	0.2214 (3.3355)	0.1518 (1.5762)	0.2316 (3.1893)
Urban Residence	0.7555 (24.8091)	0.2773 (4.3144)	0.7095 (21.8785)
F	214.1759	56.7351	160.1643
R^2	0.0677	0.1603	0.0568
Standard Error	2.3836	1.1510	2.4577
Number of Observations	29,349	2,920	26,429

Table 4--Continued

Dependent Variable: ln E	All (WC) Workers	1970 (WC) Federal	Private
Constant	6.4746 (94.6860)	6.6494 (60.9377)	6.9576 (38.5460)
Education	0.0567 (14.1815)	0.0875 (15.0811)	0.0215 (4.6194)
Experience	0.0532 (20.2726)	0.0681 (16.8033)	0.0409 (13.6672)
Experience Squared	-0.0012 (23.9776)	-0.0011 (-12.5073)	-0.0010 (-18.9782)
Race	-0.1710 (-5.6588)	-0.2838 (-7.6553)	-0.2330 (-6.5834)
Sex	-0.6729 (-26.5309)	-0.4935 (14.5333)	-0.6860 (-23.5908)
Spouse Present	0.3426 (9.6412)	0.2776 (6.0584)	0.4012 (9.7879)
Spouse Absent	0.1132 (1.2555)	-0.2393 (-2.0463)	0.2058 (1.9860)
Widowed	0.2765 (4.0090)	0.2889 (2.9599)	0.3592 (4.5835)
Divorced, Separated	0.3560 (6.6393)	0.1679 (2.4219)	0.4474 (7.2483)
Urban Residence	0.5183 (19.4473)	0.2534 (5.6039)	0.4601 (15.5098)
Disability	-0.4706 (-9.7307)	-0.4023 (-5.8852)	-0.4662 (-8.5150)
F	255.5121	144.6527	165.6689
R^2	0.0771	0.2270	0.0605
Standard Error	2.1770	1.1297	2.2923
Number of Observations	33,523	5,383	28,140

Table 4--Continued

Dependent Variable: ln E	All (INDUS) Workers	1970 (INDUS) Federal	Private
Constant	6.3244 (101.0118)	6.7153 (53.6551)	6.5759 (96.1872)
Education	0.0706 (19.6091)	0.0855 (12.8511)	0.0521 (13.1458)
Experience	0.0543 (22.4243)	0.0716 (15.5352)	0.0464 (17.5723)
Experience Squared	-0.0012 (-25.3237)	-0.0012 (-12.0843)	-0.0011 (-21.5342)
Race	-0.1316 (-4.7627)	-0.2502 (-5.9018)	-0.1422 (-4.6761)
Sex	-0.6537 (-28.1264)	-0.4784 (-12.6638)	-0.6497 (-25.4906)
Spouse Present	0.3164 (9.6807)	0.2165 (4.2434)	0.3528 (9.8235)
Spouse Absent	0.0979 (1.1793)	-0.2710 (-1.9416)	0.1616 (1.7895)
Widowed	0.2763 (4.3365)	0.1934 (1.7014)	0.3392 (4.9118)
Divorced, Separated	0.3491 (7.0113)	0.1592 (2.0556)	0.4028 (7.3695)
Urban Residence	0.4678 (18.9950)	0.3024 (6.0089)	0.4180 (15.7805)
Disability	-0.4588 (-10.1427)	-0.3124 (-4.1180)	-0.4629 (-9.4062)
F	286.3584	109.2671	202.9536
R^2	0.0781	0.2248	0.0632
Standard Error	2.1212	1.0844	2.1977
Number of Observations	37,049	4,108	32,941

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[a] t-values in parentheses

Table 5

Overall Full-Scale Earnings Equations[a]

Dependent Variable: ln E	All Workers	1960	
		Federal	Private
Constant	5.1238 (59.3517)	5.9117 (42.5370)	5.2312 (57.9325)
Education	0.0833 (16.8519)	0.0463 (5.1108)	0.0657 (12.3917)
Experience	0.0449 (14.4688)	0.0614 (11.1602)	0.0353 (10.8546)
Experience Squared	-0.0010 (-18.5527)	-0.0010 (-8.7071)	-0.0009 (-15.5436)
Race	-0.2463 (-6.8575)	-0.2114 (-3.6558)	-0.2692 (-6.9026)
Sex	-0.2932 (-8.9948)	-0.5461 (-10.4929)	-0.2366 (-6.6704)
Spouse Present	0.1651 (4.1109)	-0.0309 (-0.5013)	0.1911 (4.3729)
Spouse Absent	-0.0429 (-0.4418)	-0.1423 (-0.8302)	0.0007 (0.0070)
Widowed	0.2096 (2.7108)	0.1271 (0.9950)	0.2369 (2.8409)
Divorced, Separated	0.2016 (3.0830)	0.1630 (1.7012)	0.1959 (2.7443)
Urban Residence	0.7835 (26.1111)	0.2736 (4.2724)	0.7350 (23.0811)
Professionals	0.1686 (3.3823)	0.3569 (5.7617)	0.1395 (2.4786)
Managers	-0.7964 (-13.9486)	0.2717 (3.0129)	-0.8065 (-13.0203)
Sales			
Craftsmen	0.7761 (16.4955)	0.1408 (1.6759)	0.8865 (17.5377)

Table 5--Continued

Dependent Variable: ln E	All Workers	1960 Federal	Private
Operatives	0.8094 (19.0378)	-0.0497 (-0.4151)	0.9207 (20.5113)
Laborers	0.5103 (7.6638)	-0.2242 (-1.5723)	0.6003 (8.5175)
Service	-0.1006 (-1.8305)	-0.1993 (-1.8778)	-0.0429 (-0.7315)
F	200.6610	38.6159	169.4068
R^2	0.0982	0.1709	0.0925
Standard Error	2.3444	1.1437	2.4107
Number of Observations	29,349	2,920	26,429

Table 5--Continued

Dependent Variable: ln E	All Workers	1970 (UC) Federal	Private
Constant	6.2004 (77.0982)	7.0266 (57.8585)	6.3597 (69.9751)
Education	0.0633 (13.6897)	0.0591 (8.5803)	0.0422 (8.0210)
Experience	0.0513 (19.5186)	0.0551 (16.3627)	0.0380 (12.7024)
Experience Squared	-0.0011 (-22.7072)	-0.0011 (-12.3741)	-0.0009 (-17.1721)
Race	-0.1370 (-4.4499)	-0.1975 (-5.1783)	-0.2065 (-5.7397)
Sex	-0.5331 (-18.7047)	-0.4657 (-12.3102)	0.4872 (-14.8696)
Spouse Present	0.3119 (8.7844)	0.2603 (5.7214)	0.3537 (8.6419)
Spouse Absent	0.0873 (0.9729)	-0.2170 (-1.8701)	0.1577 (1.5314)
Widowed	0.2482 (3.6135)	0.2772 (2.8609)	0.3101 (3.9837)
Divorced, Separated	0.3435 (6.4333)	0.1599 (2.3237)	0.4181 (6.8115)
Urban Residence	0.5544 (20.7976)	0.2471 (5.5006)	0.5022 (16.9514)
Professional	0.2048 (4.7299)	0.2529 (5.7478)	0.1367 (2.5414)
Manager	0.0667 (1.3297)	0.3195 (5.3807)	0.1515 (2.5676)
Sales	-0.2389 (-4.5635)	-0.6469 (-2.5676)	0.0346 (0.6030)
Craftsmen	0.3753 (8.5994)	-0.0489 (-0.7732)	0.5934 (11.9575)

Table 5--Continued

Dependent Variable: ln E	All Workers	1970 (WC) Federal	1970 (WC) Private
Operatives	0.4139	-0.0439	0.6401
	(10.3821)	(-0.5086)	(14.2743)
Laborers	0.1017	-0.2719	0.3011
	(1.5974)	(-2.4830)	(4.2412)
Service	-0.3734	-0.3448	-0.2174
	(-8.0152)	(-4.8429)	(-4.1102)
Disability	-0.4451	-0.3891	-0.4364
	(-9.2503)	(-5.7350)	(-8.0209)
F	178.9675	95.3128	124.9387
R^2	0.0872	0.2398	0.0735
Standard Error	2.1650	1.1202	2.2764
Number of Observations	33,523	5,383	28,140

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Table 5--Continued

Dependent Variable: ln E	All (INDUS) Workers	1970 (INDUS) Federal	Private
Constant	6.1404 (82.4746)	7.0656 (51.8068)	6.1740 (76.3150)
Education	0.0694 (16.2202)	0.0550 (7.2045)	0.0577 (12.3810)
Experience	0.0524 (21.6496)	0.0583 (14.8622)	0.0437 (16.5544)
Experience Squared	-0.0011 (-24.1860)	-0.0012 (-11.7051)	-0.0010 (-19.9569)
Race	-0.0979 (-3.4827)	-0.1735 (-4.0134)	-0.1133 (-3.6610)
Sex	-0.5164 (-19.9444)	-0.4227 (-10.0725)	-0.4615 (-16.1974)
Spouse Present	0.2869 (8.7917)	0.2042 (4.0301)	0.3111 (8.6810)
Spouse Absent	0.0693 (0.8391)	-0.2592 (-1.8722)	0.1176 (1.3104)
Widowed	0.2510 (3.9582)	0.1850 (1.6406)	0.2997 (4.3660)
Divorced, Separated	0.3399 (6.8538)	0.1512 (1.9659)	0.3829 (7.0447)
Urban Residence	0.4996 (20.2993)	0.2973 (5.9439)	0.4523 (17.1079)
Professional	0.2937 (7.7479)	0.3154 (6.5383)	0.3610 (8.3241)
Manager	0.1114 (2.3559)	0.3548 (5.7616)	0.1774 (3.3141)
Sales	-0.2358 (-4.6726)	-0.5626 (-1.4748)	-0.0210 (-0.3901)
Craftsmen	0.4035 (9.7728)	-0.0204 (-0.2686)	0.6019 (13.2644)

Table 5--Continued

Dependent Variable: ln E	All (INDUS) Workers	1970 (INDUS) Federal	Private
Operative	0.4030 (10.6280)	-0.0802 (-0.6766)	0.5894 (14.3255)
Laborer	0.1228 (2.0502)	-0.2281 (-1.6839)	0.2951 (4.5874)
Service	-0.3134 (-7.4011)	-0.1872 (-2.0019)	-0.1661 (-3.6109)
Disability	-0.4340 (-9.6436)	-0.2920 (-3.8773)	-0.4355 (-8.9045)
F	201.1182	72.0735	151.2699
R^2	0.0886	0.2375	0.0759
Standard Error	2.1091	1.0754	2.1827
Number of Observations	37,049	4,108	32,941

[a] t values in parentheses

Table 6

Overall Personal Characteristics Wage Equations[a]

Dependent Variable: ln W	All Workers	1960	
		Federal	Private
Constant	-0.9561 (-12.5149)	-0.6094 (-4.4506)	-0.6473 (-7.7610)
Education	0.0260 (6.0077)	0.0701 (9.8425)	0.0025 (0.5262)
Experience	0.0192 (6.0487)	0.0409 (7.8459)	0.0108 (3.1309)
Experience Squared	-0.0007 (-12.2265)	-0.0006 (-5.5311)	-0.0006 (-9.9582)
Race	-0.1124 (-3.1505)	-0.2488 (-4.8573)	-0.1320 (-3.3862)
Sex	-0.0936 (-3.0279)	-0.4962 (-11.0004)	-0.0363 (-1.0751)
Spouse Present	0.0745 (1.8131)	-0.0704 (-1.2026)	0.0994 (2.2111)
Spouse Absent	-0.1219 (-1.2207)	-0.1749 (-1.0766)	-0.0894 (-0.8311)
Widowed	0.0928 (1.1694)	0.0292 (0.2404)	0.1248 (1.4502)
Divorced, Separated	0.1019 (1.5189)	0.0918 (1.0086)	0.1057 (1.4362)
Urban Residence	0.6885 (22.3701)	0.2221 (3.6554)	0.6495 (19.7608)
F	132.1406	41.0149	100.8951
R^2	0.0428	0.1206	0.0354
Standard Error	2.4091	1.0880	2.4911
Number of Observations	29,349	2,920	26,429

Table 6--Continued

Dependent Variable: ln W	All Workers	1970 (WC) Federal	1970 (WC) Private
Constant	-0.5482 (-8.0616)	-0.5963 (-5.6230)	-0.0543 (-0.8219)
Education	0.0469 (11.7972)	0.0867 (15.3661)	0.0126 (2.7209)
Experience	0.0267 (10.2395)	0.0488 (12.3917)	0.0138 (4.6208)
Experience Squared	-0.0007 (-14.1292)	-0.0008 (-8.7817)	-0.0005 (-9.9061)
Race	-0.1246 (-4.1478)	-0.2405 (-6.6756)	-0.1715 (-4.8573)
Sex	-0.3343 (-13.2554)	-0.3494 (-10.5890)	-0.3075 (-10.6012)
Spouse Present	0.1710 (4.8400)	0.1772 (3.9786)	0.2062 (5.0432)
Spouse Absent	-0.0294 (-0.3279)	-0.2729 (-2.4011)	0.0337 (0.3258)
Widowed	0.1443 (2.1043)	0.1507 (1.5885)	0.2065 (2.6442)
Divorced, Separated	0.1302 (2.4424)	0.0179 (0.2656)	0.1983 (3.2217)
Urban Residence	0.4909 (18.5201)	0.1848 (4.2046)	0.4469 (15.1016)
Disability	-0.2766 (-5.7513)	-0.3012 (-4.5345)	-0.2592 (-4.7468)
F	128.0905	97.2416	75.4090
R^2	0.0400	0.1644	0.0283
Standard Error	2.1649	1.0979	2.2866
Number of Observations	33,523	5,383	28,140

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Table 6--Continued

Dependent Variable: ln W	All Workers	1970 (INDUS) Federal	Private
Constant	-0.6957 (-11.2019)	-0.5783 (-4.7755)	-0.4366 (-6.4226)
Education	0.0620 (17.3679)	0.0854 (-13.2615)	0.0440 (11.1548)
Experience	0.0267 (11.1312)	0.0553 (12.4024)	0.0181 (6.8778)
Experience Squared	-0.0007 (-14.4173)	-0.0009 (-9.3949)	-0.0005 (-11.1013)
Race	-0.0946 (-3.4510)	-0.2330 (-5.6790)	-0.0968 (-3.2024)
Sex	-0.2975 (-12.9030)	-0.3638 (-9.9497)	-0.2630 (-10.3750)
Spouse Present	0.1516 (4.6747)	0.1233 (2.4974)	0.1717 (0.8084)
Spouse Absent	-0.0327 (-0.3976)	-0.1932 (-1.4304)	0.0023 (0.0252)
Widowed	0.1323 (2.0929)	0.0531 (0.4828)	0.1770 (2.5779)
Divorced, Separated	0.1177 (2.3827)	0.0235 (0.3140)	0.1539 (2.8305)
Urban Residence	0.4377 (17.9161)	0.2279 (4.6734)	0.4005 (15.2032)
Disability	-0.2785 (-6.2075)	-0.2303 (-3.1372)	-0.2741 (-5.6013)
F	145.6709	79.3864	94.9958
R^2	0.0412	0.1735	0.0304
Standard Error	2.1042	1.0495	2.1853
Number of Observations	37,049	4,108	32,941

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[a] t-values in parentheses.

Table 7

Overall Full-Scale Wage Equations[a]

Dependent Variable: ln W	All Workers	1950	
		Federal	Private
Constant	-1.8295 (-21.3891)	-0.3595 (-2.3399)	-1.6547 (-17.9328)
Education	0.0558 (13.1450)	0.0461 (5.3868)	0.0487 (8.9484)
Experience	0.0198 (6.3323)	0.0398 (7.6495)	0.0114 (3.3636)
Experience Squared	-0.0006 (-10.6668)	-0.0006 (-5.5439)	-0.0005 (-8.1894)
Race	-0.1082 (-2.9904)	-0.1555 (-2.8440)	-0.1216 (-3.0861)
Sex	0.0641 (1.9511)	-0.4401 (-8.9427)	0.1468 (4.0961)
Spouse Present	0.0529 (1.3084)	-0.0734 (-1.2595)	0.0679 (1.5376)
Spouse Absent	-0.0994 (-1.0156)	-0.1258 (-0.7763)	-0.0736 (-0.6996)
Widowed	0.0720 (0.9242)	0.0343 (0.2842)	0.0883 (1.0479)
Divorced, Separated	0.0870 (1.3201)	0.1034 (1.1415)	0.0762 (1.0563)
Urban Residence	0.7209 (23.8457)	0.2172 (3.5362)	0.6815 (21.1562)
Professional	0.2405 (4.7869)	0.3196 (5.4566)	0.2120 (3.7258)
Manager	-0.9454 (-16.4360)	0.2288 (2.6331)	-0.9773 (-15.6172)
Sales			
Craftsmen	0.8180 (17.2554)	0.1042 (1.3113)	0.9303 (18.2167)

Table 7--Continued

Dependent Variable: ln W	All Workers	1960 Federal	Private
Operative	0.8249 (19.2583)	-0.0899 (-0.7937)	0.9268 (20.4367)
Laborer	0.7259 (10.8211)	-0.1279 (-0.9483)	0.3182 (11.4907)
Service	-0.0314 (-1.4700)	-0.2482 (-2.4723)	-0.0353 (-0.5955)
F	160.2434	28.4776	142.6359
R^2	0.0799	0.1309	0.0790
Standard Error	2.3620	1.0815	2.4355
Number of Observations	29,349	2,920	26,429

Table 7--Continued

Dependent Variable: ln W	All (WC) Workers	1970 (WC)	
		Federal	Private
Constant	-0.8881 (-11.0817)	-0.2506 (-2.1202)	-0.7021 (-7.7283)
Education	0.0563 (12.2373)	0.0592 (8.9714)	0.0354 (6.7399)
Experience	0.0257 (9.8230)	0.0468 (11.9167)	0.0120 (4.0173)
Experience Squared	-0.0006 (-13.1023)	-0.0007 (-8.6083)	-0.0005 (-8.3898)
Race	-0.1063 (-3.4712)	-0.1672 (-4.5035)	-0.1607 (-4.4767)
Sex	-0.1956 (-6.8967)	-0.3224 (-8.7546)	-0.1159 (-3.5428)
Spouse Present	0.1489 (4.2136)	0.1624 (3.5673)	0.1704 (4.1724)
Spouse Absent	-0.0530 (-0.5941)	-0.2527 (-2.2366)	-0.0032 (-0.0802)
Widowed	0.1175 (1.7192)	0.1396 (1.4799)	0.1625 (2.0913)
Divorced, Separated	0.1211 (2.2785)	0.0110 (0.1644)	0.1753 (2.8612)
Urban Residence	0.5254 (19.8068)	0.1804 (4.1258)	0.4861 (16.4402)
Professional	0.2390 (5.5476)	0.2501 (5.8387)	0.1671 (3.1142)
Manager	-0.0469 (-0.9409)	0.2858 (4.9617)	-0.0013 (-0.0222)
Sales	-0.0993 (-1.9048)	-0.4805 (-1.9593)	0.1435 (2.5055)
Craftsmen	0.3904 (8.9889)	-0.0653 (-1.0590)	0.6008 (12.0303)
Operative	0.4170 (10.5103)	-0.0481 (-0.5723)	0.6156 (13.7571)

Table 7--Continued

Dependent Variable: ln W	All (WC) Workers	1970 (WC) Federal	1970 (WC) Private
Laborer	0.2877 (4.5892)	-0.1929 (-1.8098)	0.4724 (6.6663)
Service	-0.2674 (-5.7666)	-0.2609 (-3.7640)	-0.1446 (-2.7395)
Disability	-0.2546 (-5.3163)	-0.2888 (-4.3735)	-0.2318 (-4.2682)
F	97.0595	64.6931	67.4184
R^2	0.0490	0.1756	0.0408
Standard Error	2.1547	1.0904	2.2718
Number of Observations	33,523	5,383	28,140

Table 7--Continued

Dependent Variable: ln W	All (INDUS) Workers	1970 (INDUS)	
		Federal	Private
Constant	-0.9437 (-12.7698)	-0.2702 (-2.0449)	-0.8768 (-10.9234)
Education	0.0629 (14.8190)	0.0581 (7.8495)	0.0512 (11.0380)
Experience	0.0257 (10.7063)	0.0524 (11.7689)	0.0164 (6.2547)
Experience Squared	-0.0006 (-13.5492)	-0.0009 (-9.0383)	-0.0005 (-9.8510)
Race	-0.0793 (-2.8413)	-0.1671 (-3.9869)	-0.0869 (-2.8211)
Sex	-0.1652 (-6.4269)	-0.3088 (-7.5960)	-0.0880 (-3.1054)
Spouse Present	0.1301 (4.0171)	0.1107 (2.2543)	0.1410 (3.9547)
Spouse Absent	-0.0586 (-0.7152)	-0.1844 (-1.3747)	-0.0363 (-0.4070)
Widowed	0.1088 (1.7289)	0.0431 (0.3941)	0.1433 (2.0982)
Divorced, Separated	0.1116 (2.2697)	0.0146 (0.1956)	0.1395 (2.5796)
Urban Residence	0.4686 (19.1810)	0.2234 (4.6101)	0.4326 (16.4474)
Professional	0.3410 (9.0640)	0.2948 (6.3084)	0.3932 (9.1117)
Manager	-0.0088 (-0.1876)	0.3158 (5.2914)	0.0165 (0.3099)
Sales	-0.1082 (-2.1594)	-0.7486 (-2.0252)	0.0755 (1.4120)
Craftsmen	0.4127 (10.0688)	-0.0173 (-0.2346)	0.5896 (13.0605)
Operative	0.4091 (10.8706)	-0.0786 (-0.6847)	0.5659 (13.8257)

Table 7--Continued

Dependant Variable: ln W	All Workers	1970 (INDUS) Federal	Private
Laborer	0.2972 (4.9992)	-0.1650 (-1.2571)	0.4475 (6.9913)
Service	-0.1969 (-4.6835)	-0.1071 (-1.1816)	-0.0852 (-1.8633)
Disability	-0.2577 (-5.7688)	-0.2134 (-2.9239)	-0.2496 (-5.1300)
F	111.2535	52.8645	82.7355
R^2	0.0508	0.1852	0.0428
Standard Error	2.0935	1.0420	2.1714
Number of Observations	37,049	4,108	32,941

[a] t-values in parentheses

Table 8

Chow Test Statistics

	1960	1970 (INDUS)	1970 (WC)
pers. ch. earnings	52.50*	52.53*	77.64*
full-scale earnings	44.66*	35.56*	53.36*
pers. ch. wage rate	11.83*	6.79*	64.60*
full-scale wage rate	39.36*	32.63*	53.34*

*significant at the 5 per cent level

Estimating the Differentials

Given the two earnings (wage rate) structures estimated for Federal and private sector workers, an estimate of the gross earnings differential between the two sectors is made with the mean values of earnings (wage rates) for each sector. However, this estimate does not indicate whether the differential is solely due to differences in characteristics between the different types of workers. If comparable workers are receiving equal pay because of a successful application of the Comparability Doctrine, the differential for 1970 should be attributable wholly to differences in characteristics between workers in the two sectors. If, however, some portion of the differential remains unaccounted for by differences between workers, then the Comparability Doctrine has been unsuccessful in achieving its basic goal and consideration must be given to an explanation of the remaining differential.

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The technique used to decompose the earnings and wage rate differentials between Federal and private workers into a portion attributable to differences in personal characteristics and an unexplained portion is that developed by Oaxaca (discussed in the preceding chapter). The specific form of this decomposition will be shown for the earnings differential between Federal and private workers, following Oaxaca's notation. The form of the decomposition of the wage rate differential follows this exactly and is obtained by substituting wage rates for earnings in the equations presented below.

Looking at the estimated mean earnings and wage rates for Federal and private workers in 1960 and 1970 in the equations estimated to perform the Chow test reveals that the mean values for Federal earnings (and wage rates) exceed those for private earnings (and wage rates) in both years and for both divisions of the 1970 census (subdivisions by industry classification -- labelled 1970 INDUS -- and work class variables -- labelled 1970 WC).

	Federal				Private			
	$\overline{\ln E}$	$\overline{E}$	$\overline{\ln W}$	$\overline{W}$	$\overline{\ln E}$	$\overline{E}$	$\overline{\ln W}$	$\overline{W}$
1960	8.372	$4,324.27	0.826	$2.28	6.993	$1,088.98	-0.378	$ .69
1970 INDUS	8.902	$7,346.65	1.366	$3.92	7.759	$2,342.56	0.407	$1.50
1970 WC	8.816	$6,741.25	1.302	$3.68	7.674	$2,151.67	0.304	$1.36

This is directly the opposite of the relationship the proponents of the Comparability Doctrine described for 1960. The policymakers maintained that the differential for comparable workers in the two sectors had disappeared by 1970. The observation that these two different groups of workers are paid differently leads to the realization that they must differ in some characteristic which the market values. The usual explanation in economic theory is that they differ in productivity. However, if, in addition, these two groups are paid differently because they differ in some personal characteristic unrelated to productivity, it can be said that discrimination, as Kenneth Arrow defines it, exists.[24] Results of the Chow test reported in Table 8, confirm that Federal and private workers are paid according to significantly different earnings and wage rate structures. Therefore, if the relative earnings (wage rates) of Federal workers are greater than what they would receive if both Federal and private workers were paid according to the same earnings (wage rate) structure, then discrimination exists in favor of Federal workers. This term is not normally used to refer to an advantage enjoyed by a particular group of workers. From the standpoint of the economy as a whole, this is discrimination against private sector workers. However, from the individual worker's point of view, this is an economic rent paid to the Federal worker. Because the method used to decompose the gross differential is derived from the economics of discrimination, this component of the Federal-private earnings differential is referred to in the theoretical analysis below as the part which is attributable to discrimination. In the empirical analysis of the earnings and wage rate differentials in subsequent chapters, however, this component is more correctly termed an economic rent.

Discrimination can be measured in terms of the type of discrimination coefficient specified by Oaxaca:[25]

$$(11)\quad D = \frac{E_F/E_P - (E_F/E_P)^\circ}{(E_F/E_P)^\circ}$$

where

(E_F/E_P) is the observed Federal/private earnings ratio

$(E_F/E_P)^\circ$ is the earnings ratio which would exist in the absence of discrimination

Oaxaca's discrimination coefficient was written in terms of wage ratios. The discrimination coefficient for Federal wage rates would then correspond exactly to Oaxaca's for male wage rates.

Equation (11) can be re-written in terms of natural logarithms as

$$(12)\quad \ln(D + 1) = \ln(E_F/E_P) - \ln(E_F/E_P)^\circ.$$

Since the Federal/private earnings ratio is known, the problem in estimating the discrimination coefficient is to estimate the unobserved Federal/private earnings ratio which would exist in the absence of discrimination. This ratio is estimated by the same technique Oaxaca used in estimating the male/female wage ratio which would exist in the absence of discrimination. This method is to assume that in the absence of discrimination both Federal and private workers would be paid either according to the earnings structure estimated for Federal workers or the earnings structure estimated for private workers. These assumptions are used in decomposing the gross Federal-private differential into a portion attributable to differences in characteristics between the two groups of workers and a portion attributable to discrimination.

The gross earnings differential between Federal and private workers can be written

$$(13) \quad G = \frac{\overline{E}_F - \overline{E}_P}{\overline{E}_P}$$

where

$\overline{E}_F$ and $\overline{E}_P$ are the mean earnings of Federal and private workers respectively.

Taking the logarithmic transformation of this, equation (11) can be re-written as

$$(14) \quad \ln(G + 1) = \ln \overline{E}_F - \ln \overline{E}_P.$$

The earnings equations estimated for these two groups of workers can be written in general terms as

$$(15) \quad \ln E_F = Z_F'\hat{B}_F + e_F$$

$$(16) \quad \ln E_P = Z_P'\hat{B}_P + e_P$$

where Z_F' and Z_P' are vectors of the independent variables for Federal and private workers, respectively

$\hat{B}_F$ and $\hat{B}_P$ are vectors of the coefficients estimated in these equations for Federal and private workers, respectively

e_F and e_P are the corresponding vectors of regression residuals.

Using the property that an equation estimated by ordinary least squares passes through the mean values of the dependent and independent variables, equation (14) can be re-written as

$$(17) \quad \ln (G + 1) = \overline{Z}_F'\hat{B}_F - \overline{Z}_P'\hat{B}_P$$

where:

$\overline{Z}_F'$ and $\overline{Z}_P'$ are vectors of the mean values of the independent variables for Federal and private workers, respectively

$\hat{B}_F$ and $\hat{B}_P$ are defined above for equations (15) and (16)

The differences between the vectors of the mean values of the independent variables for the two groups of workers can be written as

(18) $\Delta\overline{Z}' = \overline{Z}_F' - \overline{Z}_P'$.

The difference between the vectors of estimated coefficients for Federal and private workers can be written as

(19) $\Delta\hat{B} = \hat{B}_P - \hat{B}_F$.

Then, the Federal-private earnings differential can be decomposed by substituting $\hat{B}_F = \hat{B}_P - \Delta\hat{B}$ into equation (17)

(20) $\ln (G + 1) = \overline{Z}_F' (\hat{B}_P - \Delta\hat{B}) - \overline{Z}_P'\hat{B}_P$.

Using the relation defined in equation (18), this becomes

(21) $\ln (G + 1) = \Delta\overline{Z}'\hat{B}_P - \overline{Z}_F'\Delta\hat{B}$.

Assuming that in the absence of discrimination the earnings structure estimated for private workers would apply to both Federal and private workers and using the definition of the discrimination coefficient in equation (12), it can be shown that the first term on the right hand side of equation (21) represents the portion of the gross Federal-private differential which is attributable to differences in characteristics between the two groups of workers. In other words, it is an estimate of the Federal/

private earnings ratio which would exist in the absence of discrimination under the assumption that the estimated private earnings structure would apply to both groups of workers:

$$(22)\quad \ln\left(\frac{\hat{E}_F}{\bar{E}_P}\right)^{\circ} = \bar{Z}_F'\hat{B}_P - \bar{Z}_P'\hat{B}_P = \Delta\bar{Z}'\hat{B}_P$$

Using again the properties of least squares estimates, an equivalent expression of this relationship of the type Malkiel and Malkiel used for estimation is[26]

$$(22a)\quad \ln\left(\frac{\hat{E}_F}{\bar{E}_P}\right)^{\circ} = \bar{Z}_F'\hat{B}_P - \ln(\overline{E_P})$$

Under the same assumption with respect to the earnings structure which would prevail in a nondiscriminating labor market and using the formula for the discrimination coefficient in equation (12), it can be shown that the second term on the right hand side of equation (21) represents the portion of the gross differential attributable to discrimination. In other words, it is an estimate of the natural logarithm of one plus the discrimination coefficient. Equation (12) can be written in terms of known quantities as:

$$(23)\quad \ln(\hat{D} + 1) = \ln(\bar{E}_F/\bar{E}_P) - \ln(\hat{E}_F/\bar{E}_P)^{\circ}$$

Substituting equation (21) for $\ln(\bar{E}_F/\bar{E}_P)$ and equation (22) for $\ln(\hat{E}_F/\bar{E}_P)^{\circ}$, equation (23) becomes

$$(24)\quad \ln(\hat{D} + 1) = \Delta\bar{Z}'\hat{B}_P - \bar{Z}_F'\Delta\hat{B} - \Delta\bar{Z}'\hat{B}_P = -\bar{Z}_F'\Delta\hat{B}$$

An equivalent expression along the lines of Malkiel and Malkiel's analysis is

(24a) $\ln (D + 1) = \ln (\overline{E}_{P}) - \overline{Z}_{F}\hat{B}_{P}$

An alternative decomposition of the gross earnings differential is obtained by substituting $\hat{B}_{P} = \Delta\hat{B} + \hat{B}_{F}$ into equation (17):

(25) $\ln (G + 1) = \overline{Z}_{F}'\hat{B}_{F} - \overline{Z}_{P}' (\Delta\hat{B} + \hat{B}_{F})$

Using the relation defined in equation (18), this becomes

(26) $\ln (G + 1) = \Delta\overline{Z}'\hat{B}_{F} - \overline{Z}_{P}'\Delta\hat{B}$

Then, assuming that in the absence of discrimination the estimated Federal earnings structure would apply to both types of workers and using the formula for the discrimination coefficient in equation (12), the components of the gross differential can be identified in equations (27) and (28) in the same manner as above:

(27) $\ln \left(\frac{\hat{E}_{F}}{E_{P}} \right)^{o} = \Delta\overline{Z}'\hat{B}_{F}$

An equivalent expression along the lines of Malkiel and Malkiel's analysis is

(27a) $\ln \left(\frac{\hat{E}_{P}}{E_{F}} \right)^{o} = \ln (\overline{E}_{F}) - \overline{Z}_{P}'\hat{B}_{F}$

(28) $\ln (D + 1) = -\overline{Z}_{P}\Delta\hat{B}$

An equivalent expression along the lines of Malkiel and Malkiel's analysis is

$$(28a)\ \ln(\hat{D}+1) = Z_P'\hat{\beta}_F - \ln(\overline{E_P})$$

These alternative methods of estimating the components of the gross differential give different values because the possibility of two different earnings structures results in an index number problem. In the absence of discrimination, the actual earnings structure probably would not coincide with either the estimated Federal or the estimated private earnings structure. However, the structure that would exist in the absence of discrimination is unknowable. Estimating earnings on the basis of the two alternative assumptions about this structure provides a range of possible values for the two components of the gross differentials which should include the true values of these components.

Summary and Conclusions

In order to study earnings and wage rate differentials between Federal and private sector workers, it is necessary to estimate earnings and wage rate structures for the two groups. These can be derived from the post-schooling investment models of human capital theory. The exact specification of these equations depends on the information available in the data used to estimate them. Two sets of data are used for these estimations: subsamples of the 1960 and 1970 Public Use Samples pertaining to Delaware, Maryland, Virginia, and the District of Columbia. These provide data independent of the "PATC" Survey to estimate the Federal-private differentials and to evaluate the application of the Comparability Doctrine. In order to do this, the estimated differentials must be broken down into a part which is attributable to differences in characteristics between the two groups of workers and a part which is attributable to discrimination. The technique used to make this decomposition is that developed by Ronald Oaxaca to study male-female wage differentials and modified by Burton G. and Judith A. Malkiel.

The results of the estimations of the models specified in this chapter are studied in Chapter V and Chapter VI. Policy implications are considered and conclusions drawn in Chapter VII.

Footnotes

[1] For the original discussion of these models, see: Gary S. Becker, *Human Capital and the Personal Distribution of Income: An Analytic Approach*, Woytinsky Lecture No. 1, Univ. Michigan 1967; Jacob Mincer, "The Distribution of Labor Incomes: A Survey with Special Reference to the Human Capital Approach," *Journal of Economic Literature*, VIII (March 1970), pp. 1-26; and Gary S. Becker and Barry R. Chiswick, "Education and the Distribution of Earnings," *American Economic Review Papers and Proceedings*, LVI (May 1966), pp. 358-369.

[2] Mincer, "Distribution of Labor Incomes," p. 12.

[3] Alpha C. Chiang, *Fundamental Methods of Mathematical Economics* (New York: McGraw-Hill, Inc., 1967), p. 256.

[4] Mincer, "Distribution of Labor Incomes," p. 15.

[5] See Mincer, "Distribution of Labor Incomes," p. 15; Thomas Johnson, "Returns from Investment in Human Capital," *American Economic Review*, LX (September 1970), pp. 549-551; Oaxaca, "Male-Female Wage Differentials in Urban Labor Markets," Working Paper No. 23, p. 5; and Malkiel and Malkiel, "Male-Female Pay Differentials in Professional Employment," p. 694.

[6] Class of employment refers to the type of employer: Federal, state, or local government; private industry; self-employed; or working without pay. In this thesis, state and local government workers and those individuals working without pay are excluded from consideration and the comparison is made between Federal government workers and all other remaining workers who are classified simply as private sector workers.

[7] National Data Use and Access Laboratories, *Technical Documentation for the 1960 Public Use Sample PUS-1960* (Rosslyn, Virginia: n.p., 1973), pp. i-iii.

[8] U. S. Civil Service Commission, Manpower Information Systems, Manpower Statistics Division, *Annual Report of Federal Civilian Employment by Geographic Area (December 31, 1970)*, Pamphlet SM 68-05 (Washington, D.C.: U.S. Government Printing Office, n.d.), p. v.

[9] *Ibid*., pp. 16, 33, 61.

[10] For information on the occupational classifications in the 1960 census, see U. S. Bureau of the Census, *1960 Census of Population, Alphabetical Index of Occupations and*

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[12] *Ibid.*, p. 191.

[13] *Ibid.*, p. 156.

[14] U. S. Bureau of the Census, *Income Distribution in the United States, by Herman P. Miller*, A 1960 Census Monograph (Washington, D.C.: U. S. Government Printing Office, 1966), pp. 215-218.

[15] Robert Rice, "Skill, Earnings, and the Growth of Wage Supplements," *American Economic Review Papers and Proceedings*, LVI (May 1966), p. 588.

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[17] William G. Bowen and T. Aldrich Finnegan, *The Economics of Labor Force Participation* (Princeton, New Jersey: Princeton University Press, 1969), Ch. III-VIII (Hereinafter referred to as *Labor Force Participation*.).

[18] *Ibid.*, pp. 40-49.

[19] U. S. Bureau of the Census, *1970 Census Description and Technical Documentation*, p. 134.

[20] Bowen and Finnegan, *Labor Force Participation*, pp. 102-105.

[21] Oaxaca, "Male-Female Differentials," p. 698.

[22] Bowen and Finnegan, *Labor Force Participation*, p. 64.

[23] Gregory C. Chow, "Test of Equality between Sets of Coefficients in Two Linear Regressions," *Econometrica*, XXVIII (July 1960), p. 602.

[24] Kenneth J. Arrow, "The Theory of Discrimination," in *Discrimination* ed. by Ashenfelter and Rees, p. 3.

[25] Oaxaca, "Sex Discrimination," p. 125.

[26] Malkiel and Malkiel, "Male-Female Pay Differentials in Professional Employment," p. 700.

CHAPTER V

EARNINGS REGRESSIONS AND DIFFERENTIALS

The analysis of the earnings differentials between Federal government and private sector workers is made on the basis of the earnings model and the method for decomposing the estimated gross Federal-private earnings differential developed in Chapter IV. Personal characteristics and full-scale earnings equations are estimated separately for all Federal and all private sector workers using the 1960 data and several different forms of the 1970 data. The estimated gross differentials are decomposed into a part attributable to differences in characteristics and a part representing an economic rent. These results provide an overview of the composition and trend of the Federal-private earnings differential and of clear patterns in the regression coefficients estimated for Federal and private workers. They also facilitate selection of the best form of the 1970 data for use in further estimations.

To examine the comparability of Federal and private workers, however, a finer division of these two sectors is necessary. Personal characteristics and full-scale earnings equations are estimated separately on Federal and private workers in eight race-sex groups for the 1960 data and the preferred form of the 1970 data. These equations are used to estimate the components of the gross earnings differential for each group and clear patterns in the coefficients and differentials are observed. One representative equation is analyzed in detail for each year with respect to the implications of its estimated coefficients. Conclusions are drawn concerning the success of the Comparability Doctrine.

Overall Federal-Private Earnings Differentials

Both sets of earnings equations (personal characteristics and full-scale specifications) are estimated separately for all Federal and all private workers in four sets of data.[1] Coefficients are not estimated in the following cases: 1) the characteristic serves as the base group; 2) there are no observations in the cell; 3) the variable is omitted because of poor results in earlier regressions. The first three sets of data employed are the 1960 data, the 1970 data divided by the industry classification variable--labelled 1970 (INDUS)--and the 1970 data divided by the work class variable--labelled 1970 (WC). The estimated personal characteristics equations for these data sets are presented in Table 4 in Chapter IV and the estimated full-scale equations are presented in Table 5.

These equations are also estimated for a fourth data set which is formed by eliminating all professional, technical, and kindred workers from the 1970 data divided by the work class variable. This set of equations is estimated to verify the assumption made in Chapter IV that the high percentage of professional, technical, and kindred workers located in the geographic area covered by these tapes does not affect the representativeness of the estimated relationship between Federal and private sector earnings. A total of 28,756 individuals, contained in this data set, are categorized in Table 9.

Table 9

Non-Professional Workers in 1970 Data (WC)

	Private Workers		Federal Workers	
Total	24,907	100.0	3,749	100.0
White	19,422	78.0	2,491	66.4
Non-White	5,485	22.0	1,258	33.6
Male	15,203	61.0	2,074	55.3
Female	9,704	39.0	1,675	44.7

The Chow test confirms that the estimated Federal and private earnings structures are significantly different.[2]

In all four data sets mean earnings of Federal workers exceed mean earnings of private sector workers.[3] The estimated personal characteristics and full-scale earnings equations are used to decompose the gross Federal-private earnings differential into a part attributable to differences in characteristics between the two types of workers and a part attributable to an economic rent paid to Federal workers. Tables 10 and 11 present the analyses of these differentials based on the personal characteristics and full-scale equations.

Certain clear patterns in the relationship between Federal and private earnings emerge in the estimated earnings equations and decomposed differentials. The overall Federal-private differential fell by approximately 23 per cent from

Table 10

Analysis of Earnings Differentials from Overall Personal Characteristics Earnings Equations

	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	1960		1970 (WC)	
	$\ln \overline{E}_F=8.372$	$\overline{E}_F=\$4,324.27$	$\ln \overline{E}_F=8.816$	$\overline{E}_F=\$6,741.25$
	$\ln \overline{E}_P=6.993$	$\overline{E}_P=\$1,088.98$	$\ln \overline{E}_P=7.674$	$\overline{E}_P=\$2,151.67$
	$\ln(G+1)=1.479$		$\ln(G+1)=1.142$	
Due to Different Characteristics	0.2769	0.3171	0.2415	0.2149
Economic Rent	1.1021	1.0619	0.9005	0.9271
	1970 (INDUS)		Non-Professionals 1970(WC)	
	$\ln \overline{E}_F=8.902$	$\overline{E}_F=\$7,346.65$	$\ln \overline{E}_F=8.628$	$\overline{E}_F=\$5,585.89$
	$\ln \overline{E}_P=7.759$	$\overline{E}_P=\$2,342.56$	$\ln \overline{E}_P=7.646$	$\overline{E}_P=\$2,092.26$
	$\ln(G+1)=1.143$		$\ln(G+1)=0.982$	
Due to Different Characteristics	0.2706	0.2527	0.1325	0.1745
Economic Rent	0.8724	0.8903	0.8495	0.8075

Table 11

Analysis of Earnings Differentials from Overall Full-Scale Earnings Equations

	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	1960		1970 (WC)	
	$\ln \overline{E}_F=8.372$	$\overline{E}_F=\$4,324.27$	$\ln \overline{E}_F=8.816$	$\overline{E}_F=\$6,741.25$
	$\ln \overline{E}_P=6.993$	$\overline{E}_P=\$1,088.98$	$\ln \overline{E}_P=7.674$	$\overline{E}_P=\$2,151.67$
	$\ln(G+1)=1.379$		$\ln(G+1)=1.142$	
Due to Different Characteristics	0.2697	0.2403	0.3308	0.1449
Economic Rent	1.1093	1.1387	0.8112	0.9971
	1970 (INDUS)		Non-Professionals 1970(WC)	
	$\ln \overline{E}_F=8.902$	$\overline{E}_F=\$7,346.65$	$\ln \overline{E}_F=8.628$	$\overline{E}_F=\$5,585.89$
	$\ln \overline{E}_P=7.759$	$\overline{E}_P=\$2,342.56$	$\ln \overline{E}_P=7.646$	$\overline{E}_P=\$2,092.26$
	$\ln(G+1)=1.143$		$\ln(G+1)=0.982$	
Due to Different Characteristics	0.3678	0.1998	0.2028	0.0902
Economic Rent	0.7752	0.9432	0.7792	0.8918

a gross earnings differential of 1.479 (in logs) in 1960 to a gross earnings differential of 1.142 (in logs) in 1970. However, the largest portion of the differential estimated with the personal characteristics equations in both years consists of an economic rent to Federal workers. In the overall differentials in both years, more than 70 per cent is economic rent. The differential in logs is the proportional differential between Federal and private sector earnings. In absolute dollar terms, the difference between Federal and private earnings rose from $3,235 in 1960 to $4,589 in 1970. Although the absolute differential in dollar terms gives a clearer picture of the size of the Federal-private differential, the proportional differential is preferred for discussion in this study because this form facilitates comparisons across groups and between years. In the case of non-professional workers, where the gross earnings differential is smallest in absolute terms (0.982 in logs), the economic rent is a larger proportion than in any of the other differentials (87 per cent when Federal regression weights are used and 82 per cent when private regression weights are used). In the analysis of these differentials on the basis of the full-scale equations, presented in Table 11, this economic rent to Federal workers accounts for more than half of all the gross earnings differentials estimated. The estimated equations for non-professional workers are consistent with those for all workers in the sample indicating that the high percentage of professional, technical, and kindred workers in the sample does not alter the relationship between Federal and private earnings.

Personal Characteristics Earnings Equations

The estimated personal characteristics equations show several patterns which are consistent through the four data sets. The factors which affect the appearance of the economic rent are evident in the differences between the estimated coefficients for the two sectors. The education and experience variables are significant at the 1 per cent level for both types of workers in all equations.[4] However, the rates of return to education and to experience[5] are consistently higher in the Federal sector. The rate of return to education in these equations ranges in size from 0.0721 to 0.0875 for Federal workers and from 0.0215 to 0.0667 for private workers. The race and sex variables, included to account for the effects of discrimination against non-whites and females are also significant at the 1 per cent level in all equations. They indicate that the effects of racial discrimination are consistently stronger in the Federal sector. Discrimination by sex is stronger in the private sector for all the 1970 data sets but is stronger in the Federal sector in the 1960 equation. Given the equation specification employed, the coefficients of these variables are direct estimates of the proportional differential associated with race and sex. In each of these equations, the sex differential is larger than the racial differential. The

Table 12

Personal Characteristics Earnings Equation for Non-Professionals[a]

Dependent Variable: ln E	All Workers	Non-Professional 1970(WC) Federal	 Private
Constant	6.2531 (83.4087)	6.6670 (47.2822)	6.5490 (78.3393)
Education	0.0667 (14.3778)	0.0793 (9.7035)	0.0447 (8.5900)
Experience	0.0566 (20.1306)	0.0633 (12.4688)	0.0493 (15.7855)
Experience Squared	-0.0012 (-23.1915)	-0.0010 (-9.4291)	-0.0011 (-19.8586)
Race	-0.1675 (-5.3962)	-0.2722 (-6.2132)	-0.2280 (-6.4129)
Sex	-0.6915 (-25.6804)	-0.5053 (12.0443)	-0.7249 (24.0743)
Spouse Present	0.3706 (9.7312)	0.3277 (5.6568)	0.4099 (9.5925)
Spouse Absent	0.0974 (1.0350)	-0.3062 (-2.1888)	0.1783 (1.6863)
Widowed	0.3060 (4.2255)	0.3891 (3.2578)	0.3614 (4.4986)
Divorced, Separated	0.3777 (6.7099)	0.2343 (2.7804)	0.4383 (6.9307)
Urban Residence	0.5291 (18.8933)	0.3346 (5.8304)	0.4804 (15.7614)
Disability	-0.4940 (-9.7970)	-0.5087 (-5.9989)	-0.4809 (-8.6395)
F	232.0062	83.0227	174.5050
R^2	0.0815	0.1940	0.0712
Standard Error	2.1468	1.2005	2.2349
Number of Observations	28,656	3,749	24,907

[a] t-values in parentheses.

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estimated racial differentials range in size from -0.1422 to -0.3146 while the sex differentials range in size from -0.4084 to -0.6860.

The coefficient of the urban residence variable is also significant at the 1 per cent level throughout the equations. It is larger in the private sector in all cases. This is intuitively reasonable since it indicates that differences in job opportunities and other pecuniary and non-pecuniary factors associated with urban areas have a greater effect on private earnings than on Federal earnings.

The coefficient of the disability variable is significant at the 1 per cent level in the equations estimated with the 1970 data. It is larger in the Federal sector for non-professionals but in the private sector for the other 1970 data set. It is also larger for both Federal and private non-professional workers than for either sector in the other equations. It is important to note that this variable does not measure solely the effect of health on earnings but interacts with other personal characteristics.

Full-Scale Earnings Equations

When occupational variables are included and the full-scale earnings equations are estimated on the four data sets, these patterns in the estimated coefficients are altered. Controlling for broad occupational groupings reduces the coefficients of education and experience because part of the rates of return to education and experience are realized through choice of occupation. The coefficients of

Table 13

Full-Scale Earnings Equation
for Non-Professionals[a]

Dependent Variable: ln E	All Workers	Non-Professional 1970(WC) Federal	Private
Constant	5.8381 (68.4190)	7.0428 (44.8483)	5.9130 (52.8384)
Education	0.0845 (17.0093)	0.0543 (6.0164)	0.0678 (12.3270)
Experience	0.0552 (19.6310)	0.0618 (12.1871)	0.0469 (15.0220)
Experience Squared	-0.0011 (-21.8649)	-0.0010 (-9.4065)	-0.0010 (-18.0358)
Race	-0.1441 (-4.5603)	-0.1983 (-4.4090)	-0.2109 (-5.8470)
Sex	-0.5417 (-17.6160)	-0.4974 (-10.3672)	-0.5091 (-14.7868)
Spouse Present	0.3344 (8.7901)	0.3119 (5.4151)	0.3567 (8.3671)
Spouse Absent	0.0653 (0.6988)	-0.2928 (-2.1072)	0.1248 (1.1897)
Widowed	0.2704 (3.7531)	0.3859 (3.2509)	0.3014 (3.7785)
Divorced, Separated	0.3560 (6.3580)	0.2238 (2.6732)	0.4007 (6.3814)
Urban Residence	0.5751 (20.5578)	0.3208 (5.6188)	0.5296 (17.4252)
Professional			
Manager	0.0078 (0.1551)	0.3170 (4.8250)	0.0674 (1.1538)
Sales	-0.2638 (-5.0984)	-0.6404 (-2.3891)	-0.0081 (-0.1447)
Craftsmen	0.3829 (8.7425)	-0.0630 (-0.9053)	0.5893 (11.9114)

Table 13--Continued

Dependent Variable: ln E	All Workers	Non-Professional 1970(WC)	
		Federal	Private
Operative	0.4451 (11.2321)	-0.0582 (-0.6231)	0.6617 (15.0534)
Laborer	0.1541 (2.4374)	-0.2855 (-2.4078)	0.3463 (4.9773)
Service	-0.3518 (-7.6534)	-0.3511 (-4.5784)	-0.2021 (-3.9205)
Disability	-0.4668 (-9.3143)	-0.4928 (-5.8484)	-0.4480 (-8.1113)
F	175.4807	58.1607	140.6864
R^2	0.0938	0.2059	0.0870
Standard Error	2.1323	1.1917	2.2157
Number of Observations	28,656	3,749	24,907

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[a] t-values in parentheses.

the education and experience variables remain significant at the 1 per cent level. However, in the full-scale earnings equations, the estimated rate of return to education is higher in the private sector for all of the data sets except the 1970 data divided by the work class variable. The effects of race and sex are also reduced in the full-scale earnings equations because race and sex differences in occupational attachment are eliminated as sources of discrimination. These coefficients remain significant at the 1 per cent level. However, the pattern is altered so that there is no longer a consistent relationship in the size of these proportional differentials in the two sectors.

Controlling for broad occupational groupings alters the pattern of the estimated coefficients observed in the personal characteristics equations because these groupings measure different effects in the two sectors. In the Federal sector, earnings depend on job level. Certain occupations are paid at lower levels in the Federal sector than in the private sector on the basis of the job levels at which they are classified. When comparability rates are determined, they are not compared with similar occupations in the private sector but with occupations at comparable job levels. Such occupations will have opposite effects on earnings in the two sectors. Furthermore, because only broad occupational groupings are controlled for, a number of very different pay levels may be included in any one occupational group. The estimated coefficient under such conditions represents the combination of a number of contradictory effects and has little meaning. Consequently, to analyze the earnings differentials between Federal and private sector workers, the most meaningful equations to examine are the personal characteristics earnings equations. These personal characteristics variables serve as proxies for productivity. To the extent that these variables capture differences in productivity between Federal and private sector workers, that portion of the gross earnings differential which cannot be attributed to differences in the personal characteristics of the two types of workers must represent an economic rent paid to Federal workers. Nevertheless, Table 11, which presents the decomposition of the earnings differentials on the basis of the full-scale equations, is included for further information.

Differentials and Comparability

The personal characteristics and full-scale earnings equations estimated for these four data sets and the analyses of the gross Federal-private earnings differential show that Federal workers as a group earn more, on average, than comparable private sector workers. When only personal characteristics are considered, Federal workers receive a higher rate of return to their schooling and either a higher rate of return to their on-the-job training or they devote a larger proportion of their time to this training at the beginning of their work experience. However, these relationships refer to the entire set of Federal workers and the entire set of private workers. This overall relationship may conceal contradictory earnings relations among different race-sex groups: the observed economic rent may only be paid to certain types of Federal workers. It is possible that the Federal-private earnings differentials for certain race-sex groups may be in the opposite direction and when all workers of each type are examined at once, these are cancelled out. Therefore, a finer division of Federal and private sector workers is necessary to study their comparability.

Federal-Private Earnings Differentials by Race and Sex

Both earnings equations are estimated by ordinary least squares on eight race-sex groups of Federal and private workers in 1960 and 1970: whites, non-whites, males, females, white males, white females, non-white males, and non-white females. That the two methods of dividing the 1970 data yield nearly identical estimates of the gross Federal-private earnings differential and similar patterns in the estimated coefficients confirms that the industry classification method of dividing the data yields a good approximation to the desired classification of workers by type of employer. However, for regressions on the eight race-sex groups in 1970, the work class method of dividing the data is preferred because it gives a more accurate division than the industry classification variable. The industry classification variable yields a more accurate division of the 1960 data than it does of the 1970 data because the industry category "Public Administration Allocated" introduced in the 1970 data is ambiguous for the purposes of this study.[6]

The specifications of both earnings equations are very similar for both sets of data. The principal difference between the two sets of data is in the inclusion of the dummy variable for disability in the equations estimated with the 1970 data. Coefficients are not estimated in the following instances: 1) the characteristic serves as the base group; 2) there are no observations in the cell; 3) the variable is omitted because of poor results in earlier regressions.

These equations would be better specified if they also included variables for migration and union status (both private and government). However, these variables are unavailable in the data used for these estimations. Migration is another form of human capital investment and is expected to have a positive effect on earnings. To the extent that migration is associated with one or more of the variables included in the equations (such as schooling), its effect is probably captured by that variable. The effect of unions varies across race-sex groups and has been found to be greater in the public than the private sector.[7] The omission of this variable decreases the proportion of the gross differential which is considered an economic rent. Without information on the extent of unionism within each group and the union/non-union earnings differential for each group, no estimate can be made of the effect of unionism on each group's earnings. However, it can be said that to the extent that unions have raised earnings in the public sector more than in the private sector, they have increased the Federal-private earnings differential above what it would have been in the absence of unionism.[8]

In all eight race-sex groups for both years, the average earnings of Federal workers are higher than those of private workers in the same race-sex group. Tables 14 and 15 present the analyses of these differentials on the basis of the two earnings equations. In both years the largest gross earnings differential is for white males (a differential of 1.567 in logs for white males in 1960 and 1.265 in logs for white males in 1970). The smallest differential in 1960 is for white females (a differential of 1.136 in logs) while the smallest differential in 1970 is for nonwhite males (a differential of 0.879 in logs). More than half of every differential in both years consists of an economic rent paid to Federal workers. In other words, even after allowing for differences between Federal and private workers in personal characteristics which act as proxies for productivity, an earnings differential remains which is considered an economic rent paid to all Federal workers, regardless of race or sex group.

These differentials are smaller in 1970 for each race-sex group. The percentage decrease in these differentials

Table 14

Analysis of Earnings Differentials from Personal Characteristics Earnings Equations by Race and Sex

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Whites		Whites	
	$\ln \bar{E}_F=8.468$	$\bar{E}_F=\$4,759.98$	$\ln \bar{E}_F=8.965$	$\bar{E}_F=\$7,824.33$
	$\ln \bar{E}_P=7.074$	$\bar{E}_P=\$1,180.86$	$\ln \bar{E}_P=7.745$	$\bar{E}_P=\$2,309.99$
	$\ln(G+1)=1.394$		$\ln(G+1)=1.220$	
Due to Different Characteristics	0.2852	0.2995	0.2689	0.1984
Economic Rent	1.1088	1.0945	0.9511	1.0216
	Non-Whites		Non-Whites	
	$\ln \bar{E}_F=8.050$	$\bar{E}_F=\$3,133.79$	$\ln \bar{E}_F=8.408$	$\bar{E}_F=\$4,482.79$
	$\ln \bar{E}_P=6.709$	$\bar{E}_P=\$819.75$	$\ln \bar{E}_P=7.399$	$\bar{E}_P=\$1,634.35$
	$\ln(G+1)=1.341$		$\ln(G+1)=1.009$	
Due to Different Characteristics	0.1936	0.3337	0.2029	0.1742
Economic Rent	1.1474	1.0073	0.8051	0.8348
	Males		Males	
	$\ln \bar{E}_F=8.604$	$\bar{E}_F=\$5,453.43$	$\ln \bar{E}_F=9.093$	$\bar{E}_F=\$8,892.82$
	$\ln \bar{E}_P=7.106$	$\bar{E}_P=\$1,219.26$	$\ln \bar{E}_P=7.929$	$\bar{E}_P=\$2,776.65$
	$\ln(G+1)=1.498$		$\ln(G+1)=1.164$	
Due to Different Characteristics	0.2942	0.3609	0.3391	0.2432
Economic Rent	1.2038	1.1370	0.8249	0.9208

Table 14--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Females		Females	
	$\ln \bar{E}_F=7.976$	$\bar{E}_F=\$2,910.27$	$\ln \bar{E}_F= 8.367$	$\bar{E}_F=\$4,302.71$
	$\ln \bar{E}_P=6.780$	$\bar{E}_P=\$880.07$	$\ln \bar{E}_P=7.263$	$\bar{E}_P=\$1,426.53$
	$\ln(G+1)=1.196$		$\ln(G+1)=1.104$	
Due to Different Characteristics	0.3737	0.2668	0.2736	0.2144
Economic Rent	0.8223	0.9292	0.8304	0.8896
	White Males		White Males	
	$\ln \bar{E}_F=8.726$	$\bar{E}_F=\$6,161.04$	$\ln \bar{E}_F=9.242$	$\bar{E}_F=\$10,321.66$
	$\ln \bar{E}_P=7.159$	$\bar{E}_P=\$1,285.62$	$\ln \bar{E}_P=7.977$	$\bar{E}_P=\$2,913.18$
	$\ln(G+1)=1.567$		$\ln(G+1)=1.265$	
Due to Different Characteristics	0.3546	0.3615	0.3401	0.2461
Economic Rent	1.2124	1.2055	0.9249	1.0189
	White Females		White Females	
	$\ln \bar{E}_F=8.037$	$\bar{E}_F=\$3,093.32$	$\ln \bar{E}_F=8.452$	$\bar{E}_F=\$4,684.43$
	$\ln \bar{E}_P=6.901$	$\bar{E}_P=\$993.27$	$\ln \bar{E}_P=7.345$	$\bar{E}_P=\$1,548.43$
	$\ln(G+1)=1.136$		$\ln(G+1)=1.107$	
Due to Different Characteristics	0.3158	0.2923	0.2351	0.2364
Economic Rent	0.8202	0.8437	0.8719	0.8706

Table 14--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Non-White Males		Non-White Males	
	$\ln \overline{E}_F=8.209$	$\overline{E}_F=\$3,673.87$	$\ln \overline{E}_F=8.596$	$\overline{E}_F=\$5,409.98$
	$\ln \overline{E}_p=5.895$	$\overline{E}_p=\$987.33$	$\ln \overline{E}_p=7.717$	$\overline{E}_p=\$2,246.21$
	$\ln(G+1)=1.314$		$\ln(G+1)=0.879$	
Due to Different Characteristics	0.1319	0.3447	0.2350	0.1540
Economic Rent	1.1821	0.9693	0.6440	0.7250
	Non-White Females		Non-White Females	
	$\ln \overline{E}_F=7.755$	$\overline{E}_F=\$2,333.21$	$\ln \overline{E}_F=8.194$	$\overline{E}_F=\$3,619.17$
	$\ln \overline{E}_p=6.436$	$\overline{E}_p=\$623.91$	$\ln \overline{E}_p=6.997$	$\overline{E}_p=\$1,093.35$
	$\ln(G+1)=1.319$		$\ln(G+1)=1.197$	
Due to Different Characteristics	0.5716	0.1925	0.2590	0.2379
Economic Rent	0.7472	1.1265	0.9580	0.9591

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Table 15

Analysis of Earnings Differentials from Full-Scale Earnings Equations by Race and Sex

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Whites		Whites	
	$\ln \overline{E}_F=8.468$	$\overline{E}_F=\$4,759.98$	$\ln \overline{E}_F=8.965$	$\overline{E}_F=\$7,824.38$
	$\ln \overline{E}_P=7.074$	$\overline{E}_P=\$1,180.86$	$\ln \overline{E}_P=7.745$	$\overline{E}_P=\$2,309.99$
	$\ln(G+1)=1.394$		$\ln(G+1)=1.220$	
Due to Different				
Characteristics	0.2999	0.2023	0.3343	0.1774
Economic Rent	1.0941	1.1917	0.8857	1.0426
	Non-Whites		Non-Whites	
	$\ln \overline{E}_F=8.050$	$\overline{E}_F=\$3,133.79$	$\ln \overline{E}_F=8.408$	$\overline{E}_F=\$4,482.79$
	$\ln \overline{E}_P=6.709$	$\overline{E}_P=\$819.75$	$\ln \overline{E}_P=7.399$	$\overline{E}_P=\$1,634.35$
	$\ln(G+1)=1.341$		$\ln(G+1)=1.009$	
Due to Different				
Characteristics	0.1666	0.1852	0.2502	0.0304
Economic Rent	1.1744	1.1558	0.7583	0.9786
	Males		Males	
	$\ln \overline{E}_F=8.604$	$\overline{E}_F=\$5,453.43$	$\ln \overline{E}_F=9.093$	$\overline{E}_F=\$8,892.82$
	$\ln \overline{E}_P=7.106$	$\overline{E}_P=\$1,219.25$	$\ln \overline{E}_P=7.929$	$\overline{E}_P=\$2,776.66$
	$\ln(G+1)=1.498$		$\ln(G+1)=1.164$	
Due to Different				
Characteristics	0.2795	0.2781	0.3055	0.1301
Economic Rent	1.2185	1.2199	0.8535	1.0339

Table 15--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Females		Females	
	$\ln \overline{E}_F=7.975$	$\overline{E}_F=\$2,910.27$	$\ln \overline{E}_F=8.367$	$\overline{E}_F=\$4,302.71$
	$\ln \overline{E}_P=6.780$	$\overline{E}_P=\$880.07$	$\ln \overline{E}_P=7.263$	$\overline{E}_P=\$1,426.53$
	$\ln(G+1)=1.196$		$\ln(G+1)=1.104$	
Due to Different Characteristics	0.4568	0.2542	0.2534	0.1992
Economic Rent	0.7392	0.9418	0.8506	0.9048
	White Males		White Males	
	$\ln \overline{E}_F=8.726$	$\overline{E}_F=\$6,161.04$	$\ln \overline{E}_F=9.242$	$\overline{E}_F=\$10,321.66$
	$\ln \overline{E}_P=7.159$	$\overline{E}_P=\$1,285.62$	$\ln \overline{E}_P=7.977$	$\overline{E}_P=\$2,913.18$
	$\ln(G+1)=1.567$		$\ln(G+1)=1.265$	
Due to Different Characteristics	0.3636	0.3346	0.4062	0.1791
Economic Rent	1.2034	1.2324	0.8588	1.0859
	White Females		White Females	
	$\ln \overline{E}_F=8.037$	$\overline{E}_F=\$3,093.32$	$\ln \overline{E}_F=8.452$	$\overline{E}_F=\$4,684.43$
	$\ln \overline{E}_P=6.901$	$\overline{E}_P=\$993.27$	$\ln \overline{E}_P=7.345$	$\overline{E}_P=\$1,548.43$
	$\ln(G+1)=1.136$		$\ln(G+1)=1.107$	
Due to Different Characteristics	0.8014	0.2882	0.3037	0.2285
Economic Rent	0.3346	0.8478	0.8033	0.8785

Table 15--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Non-White Males		Non-White Males	
	$\ln \overline{E}_F=8.209$	$\overline{E}_F=\$3,673.87$	$\ln \overline{E}_F=8.596$	$\overline{E}_F=\$5,409.93$
	$\ln \overline{E}_p=6.895$	$\overline{E}_p=\$987.33$	$\ln \overline{E}_p=7.717$	$\overline{E}_p=\$2,246.21$
	$\ln(G+1)=1.314$		$\ln(G+1)=0.879$	
Due to Different Characteristics	0.1241	0.2530	0.2275	-0.0014
Economic Rent	1.1899	1.0610	0.6515	0.8804
	Non-White Females		Non-White Females	
	$\ln \overline{E}_F=7.755$	$\overline{E}_F=\$2,333.21$	$\ln \overline{E}_F=8.194$	$\overline{E}_F=\$3,619.17$
	$\ln \overline{E}_p=6.436$	$\overline{E}_p=\$623.91$	$\ln \overline{E}_p=6.997$	$\overline{E}_p=\$1,093.35$
	$\ln(G+1)=1.319$		$\ln(G+1)=1.197$	
Due to Different Characteristics	0.0801	-0.0065	0.2696	0.1554
Economic Rent	1.2389	1.3255	0.9274	1.0416

between 1960 and 1970 ranged from 2 per cent for white females to 33 per cent for non-white males. This decrease may reflect the difference in economic conditions in 1959 and 1969. In 1959, the unemployment rate was 5.5 per cent[9] and the economy was emerging from a recession. However, economic activity was strongly affected by a severe steel strike which began on July 15 and lasted 116 days.[10] In 1969, on the other hand, the economy was still in the longest expansion in its history. The unemployment rate was 3.5 per cent.[11] However, inflation had also been occurring for four years. This decrease in the Federal-private earnings differential during this decade may also reflect a different response of earnings in the two sectors to the inflation. If Federal workers are granted increases to compensate them for their relative losses in the inflation, the old Federal-private differential may be reestablished.

Table 15 presents the analyses of the Federal-private differentials by race-sex groups on the basis of the full-scale earnings equations. Although the proportion attributable to an economic rent changes from the analysis in Table 14, it remains more than half of the gross differential. The criticism of the use of occupational variables in a comparison of the earnings of all Federal and all private workers, noted above, also applies to a comparison of their earnings within each race-sex group: the occupational variables measure different effects in the two sectors, and in the Federal sector, at least, these variables may not be measuring any meaningful effect but rather a combination of conflicting effects. Consequently, the comparability of Federal and private workers within a specific race-sex group should be studied on the basis of the personal characteristics earnings equations.

Personal Characteristics Earnings Equations

Several clear patterns emerge in the estimated earnings equations for the race-sex groups in 1960 and 1970 which affect the appearance of the economic rent paid to Federal workers. (Tables 16, 17, 18 and 19 present these results in 1960 and Tables 20, 21, 22, and 23 show them in 1970). In both years, the estimated rate of return to education is higher for Federal workers than for private workers in every race-sex group except for non-white females in 1960 and white females in 1970. The estimated rate of return is significant at the 5 per cent level in every group except for private sector white and non-white males in both years. These are strongly affected when occupational variables are included in the full-scale equations. In 1960, the estimated rate of return to education for Federal workers ranges from 0.0252 for non-white males to 0.0923 for females. The rate in the private sector ranges from -0.0099 for non-white males (this is insignificant) to 0.0844 for non-white females. In 1970 the highest estimated rate for Federal workers is 0.1148 for non-white females and the lowest is 0.0408 for white females. The

Table 16

Personal Characteristics Earnings Equations for Whites and Non-Whites in 1960[a]

Dependent Variable: ln E	Whites 1960		Non-Whites 1960	
	Federal	Private	Federal	Private
Constant	6.5814 (40.0044)	6.2794 (65.9529)	6.6472 (21.3501)	5.5787 (38.8436)
Education	0.0802 (9.2502)	0.0246 (4.4916)	0.0423 (2.5284)	0.0282 (3.1590)
Experience	0.0625 (10.2312)	0.0353 (9.1068)	0.0593 (4.6231)	0.0499 (7.7704)
Experience Squared	-0.0010 (-7.8371)	-0.0011 (-15.4886)	-0.0009 (-3.6359)	-0.0010 (-9.6195)
Sex	-0.6588 (-12.0025)	-0.3575 (-9.0834)	-0.4387 (-4.2793)	-0.5740 (-9.5985)
Spouse Present	-0.0816 (-1.1035)	0.1940 (3.6723)	0.1954 (1.2947)	0.3029 (3.8698)
Spouse Absent	-0.1484 (-0.7165)	-0.2851 (-2.0154)	-0.2476 (-0.7772)	0.3948 (2.6568)
Widowed	0.1499 (1.0334)	0.2429 (2.3517)	0.1037 (0.3696)	0.3022 (2.1473)
Divorced, Separated	0.2238 (1.9418)	0.2404 (2.5366)	0.1343 (0.6937)	0.2415 (2.2517)
Urban Residence	0.2878 (4.1860)	0.7203 (19.2678)	0.1807 (1.0273)	0.6348 (9.9761)
F	50.5997	136.1930	7.1385	41.2750
R^2	0.1654	0.0559	0.0766	0.0580
Standard Error	1.1392	2.5358	1.1857	2.1443
Number of Observations	2,253	20,544	667	5,885

[a] t-values in parentheses.

Table 17

Personal Characteristics Earnings Equations for Males and Females in 1960[a]

Dependent Variable: ln E	Males in 1960 Federal	Males in 1960 Private	Females in 1960 Federal	Females in 1960 Private
Constant	6.5584 (49.7611)	6.3282 (60.7040)	8.3110 (13.5069)	6.8860 (30.9723)
Education	0.0610 (9.3718)	-0.0012 (-0.2102)	0.0923 (4.3025)	0.0560 (7.3461)
Experience	0.0653 (12.0166)	0.0244 (5.2832)	0.0574 (4.9393)	0.0449 (9.3898)
Experience Squared	-0.0011 (-10.2607)	-0.0010 (-12.7669)	-0.0008 (-3.0663)	-0.0008 (-9.1273)
Race	-0.3596 (-6.9781)	-0.2317 (-4.4479)	-0.1583 (-1.3807)	-0.3768 (-7.0442)
Spouse Present	0.3734 (5.5281)	0.6020 (9.8648)	-2.5086 (-5.7226)	-1.1851 (-7.3411)
Spouse Absent	0.0832 (0.4994)	0.4487 (2.9794)	-2.6063 (-4.4793)	-1.5019 (-7.3758)
Widowed	0.4648 (2.2694)	0.5749 (3.7320)	-2.3464 (-4.8089)	-1.2308 (-6.9490)
Divorced, Separated	0.3240 (2.6447)	0.3647 (3.1967)	-2.2279 (-4.7266)	-0.8941 (-5.1804)
Urban Residence	0.1945 (3.4004)	0.9173 (21.9726)	0.3905 (2.5397)	0.2359 (4.7586)
Babyborn			-0.1901 (-5.0716)	-0.0853 (-6.5181)
F	51.6326	152.2004	12.4175	37.9689
R^2	0.1986	0.0731	0.0957	0.0388
Standard Error	0.8580	2.5939	1.4898	2.1317
Number of Observations	1,840	17,260	1,080	9,169

[a] t-values in parentheses.

Table 18

Personal Characteristics Earnings Equations for White Males and Females in 1960[a]

Dependent Variable: ln E	White Males in 1960 Federal	White Males in 1960 Private	White Females in 1960 Federal	White Females in 1960 Private	ΔB
Constant	6.3796 (43.9410)	6.3570 (53.4620)	9.0692 (12.2986)	7.6213 (25.5152)	-1.4479 (-1.83)
Education	0.0728 (10.0295)	0.0025 (0.3610)	0.0866 (3.4106)	0.0470 (5.0281)	-0.0396 (-1.46)
Experience	0.0695 (11.5125)	0.0207 (3.8172)	0.0514 (4.0378)	0.0513 (9.0951)	-0.0001 (-0.007)
Experience Squared	-0.0012 (-10.0753)	-0.0010 (-10.6432)	-0.0006 (-2.1974)	-0.0010 (-9.4991)	-0.0004 (-1.33)
Spouse Present	0.2965 (3.9156)	0.6246 (8.5405)	-3.1394 (-5.7283)	-1.7782 (-8.3067)	1.3612 (2.31)
Spouse Absent	-0.0818 (-0.4059)	0.3011 (1.4680)	-2.7372 (-3.9598)	-2.3564 (-8.8180)	0.3808 (0.51)
Widowed	0.5757 (2.3067)	0.6292 (3.2723)	-2.8488 (-4.8938)	-1.8054 (-7.7985)	1.0434 (1.67)
Divorced, Separated	0.3034 (1.8145)	0.3864 (2.5688)	-2.6673 (-4.6434)	-1.4207 (-6.1998)	1.2466 (2.02)
Urban Residence	0.2403 (3.8935)	0.9030 (18.8968)	0.2759 (1.7381)	0.2807 (4.9115)	0.0048 (0.02)
Babyborn			-0.2332 (-5.1616)	-0.1255 (-7.1878)	0.1077 (2.22)
F	40.3854	132.6161	11.6536	32.2084	
R^2	0.1831	0.0711	0.1019	0.0410	
Standard Error	0.8430	2.6790	1.4682	2.1703	
Number of Observations	1,407	13,750	846	6,784	

[a] t-values in parentheses.

Table 19

Personal Characteristics Earnings Equations for Non-White Males and Females in 1960[a]

	Non-White Males in 1960		Non-White Females in 1960	
Dependent Variable: ln E	Federal	Private	Federal	Private
Constant	6.7612 (23.9968)	5.8328 (31.3060)	6.2304 (4.9846)	5.0307 (14.3477)
Education	0.0252 (1.7047)	-0.0099 (-0.8371)	0.0833 (1.9336)	0.0844 (6.3117)
Experienced	0.0475 (3.8893)	0.0465 (5.3646)	0.0938 (3.2296)	0.0478 (5.1219)
Experience Squared	-0.0007 (-3.1823)	-0.0012 (-8.4389)	-0.0017 (-2.6102)	-0.0006 (-3.5886)
Spouse Present	0.6830 (4.6945)	0.4819 (4.6597)	-0.7564 (-2.0399)	-0.2573 (-1.0777)
Spouse Absent	0.4021 (1.3444)	0.5665 (2.8176)	-2.4180 (-2.1897)	-0.1054 (-0.3481)
Widowed	0.5411 (1.4825)	0.3295 (1.3947)	-1.4770 (-1.5678)	-0.2988 (-1.1050)
Divorced, Separated	0.5575 (2.7807)	0.2267 (1.4101)	-1.6500 (-1.9182)	-0.0382 (-0.1515)
Urban Residence	-0.0396 (-0.2757)	0.9515 (11.4417)	1.3271 (2.2849)	0.0915 (9.9363)
Babyborn			-0.1104 (-1.5713)	-0.0259 (-1.3573)
F	7.4510	40.9805	2.9188	8.0261
R^2	0.1067	0.0838	0.0690	0.0258
Standard Error	0.8835	2.2174	1.5552	1.9852
Number of Observations	433	3,500	234	2,385

[a] t-values in parentheses.

Table 20

Personal Characteristics Earnings Equations for Whites and Non-Whites in 1970[a]

Dependent Variable: ln E	Whites 1970 (WC) Federal	Whites 1970 (WC) Private	Non-Whites 1970 (WC) Federal	Non-Whites 1970 (WC) Private
Constant	6.7494 (56.1839)	6.9593 (77.9025)	6.2221 (26.0219)	6.5436 (43.6267)
Education	0.0857 (13.4226)	0.0237 (4.4495)	0.0848 (5.3350)	0.0271 (2.8077)
Experience	0.0736 (16.0369)	0.437 (12.6703)	0.0566 (6.6508)	0.0410 (6.8055)
Experience Squared	-0.0012 (-12.2833)	-0.0012 (-17.9471)	-0.0008 (-4.5343)	-0.0008 (-7.9702)
Sex	-0.5724 (-14.8118)	-0.6737 (-20.0668)	-0.3060 (-4.2424)	-0.7371 (-12.9512)
Spouse Present	0.1825 (3.5115)	0.3496 (7.2734)	0.4611 (4.8679)	0.5300 (6.9475)
Spouse Absent	-0.2676 (-1.9710)	0.2563 (2.0000)	-0.1364 (-0.5958)	0.1055 (0.6393)
Widowed	0.2314 (2.0428)	0.3382 (3.5866)	0.4277 (2.2205)	0.3652 (2.7086)
Divorced, Separated	0.1493 (1.7957)	0.4658 (6.1497)	0.2165 (1.6577)	0.3972 (3.8692)
Urban Residence	0.2480 (5.3420)	0.4834 (14.4351)	0.2883 (2.1696)	0.3519 (5.5547)
Disability	-0.4145 (-5.4131)	-0.3994 (-6.2808)	-0.3859 (-2.6682)	-0.6872 (-6.5923)
F	119.7496	137.4360	22.4894	43.4708
R^2	0.2315	0.0574	0.1299	0.0690
Standard Error	1.0665	2.3429	1.2831	2.0687
Number of Observations	3,942	22,407	1,441	5,733

[a] t-values in parentheses.

Table 21

Personal Characteristics Earnings Equations for Males and Females in 1970[a]

Dependent Variable: ln E	Males 1970 (WC) Federal	Males 1970 (WC) Private	Females 1970 (WC) Federal	Females 1970 (WC) Private
Constant	6.4686 (64.2247)	7.0113 (71.4517)	6.3534 (24.0699)	6.1523 (46.9692)
Education	0.0891 (17.0291)	-0.0026 (-0.4505)	0.0657 (4.2407)	0.0584 (7.1910)
Experience	0.0689 (16.6825)	0.0370 (9.0242)	0.0753 (9.2076)	0.0505 (11.5235)
Experience Squared	-0.0012 (-13.2007)	-0.0011 (-15.4415)	-0.0013 (-6.6711)	-0.0009 (-11.3775)
Race	-0.3318 (-8.5792)	-0.1888 (-3.8709)	-0.1418 (-2.0110)	-0.2232 (-4.4430)
Spouse Present	0.6416 (12.6340)	0.8312 (14.9327)	0.0567 (0.6657)	-0.0440 (-0.7203)
Spouse Absent	0.2486 (1.9976)	0.5377 (3.6673)	-0.5988 (-2.7969)	-0.0684 (-0.4845)
Widowed	0.7464 (5.4300)	0.5379 (3.6202)	0.1373 (0.8963)	-0.0278 (-0.2963)
Divorced, Separated	0.4796 (5.5061)	0.6854 (7.3767)	0.0222 (0.1940)	0.2373 (2.9245)
Urban Residence	0.0698 (1.6495)	0.5372 (13.9468)	0.6113 (6.0793)	0.2766 (6.0527)
Babyborn			-0.1019 (-4.5949)	-0.0923 (-7.6867)
Disability	-0.1981 (-3.2432)	-0.3976 (-5.8192)	-0.9244 (-5.4874)	-0.5650 (-6.2092)
F	143,3562	111.1695	23.1976	39.1320
R^2	0.2999	0.0596	0.1061	0.0375
Standard Error	0.8668	2.3789	1.4213	2.1115
Number of Observations	3,325	17,377	2,058	10,763

[a] t-values in parentheses.

Table 22

Personal Characteristics Earnings Equations for White Males and Females in 1970[a]

	White Males 1970 (WC)		White Females 1970 (WC)		
Dependent Variable: ln E	Federal	Private	Federal	Private	ΔB
Constant	6.3533 (61.2301)	6.9771 (63.2194)	6.8626 (22.0285)	6.3244 (41.9289)	-0.5332 (-1.56)
Education	0.0944 (17.4216)	0.0031 (0.4827)	0.0408 (2.2088)	0.0488 (5.1695)	0.0080 (0.39)
Experience	0.0775 (17.3191)	0.0368 (7.8533)	0.0831 (8.6353)	0.0530 (11.4403)	-0.0251 (-2.30)
Experience Squared	-0.0013 (-13.8500)	-0.0012 (-13.9434)	-0.0014 (-6.6073)	-0.0011 (-11.5114)	0.0003 (1.00)
Spouse Present	0.5931 (10.7838)	0.7960 (12.1864)	-0.0085 (-0.0835)	-0.0695 (-0.9717)	-0.0610 (-0.49)
Spouse Absent	0.3034 (2.0448)	0.6679 (3.6515)	-0.6359 (-2.6317)	-0.0589 (-0.3442)	0.5770 (1.95)
Widowed	0.7770 (4.9194)	0.3814 (2.0982)	0.1019 (0.5589)	0.0128 (0.1148)	-0.0891 (0.41)
Divorced, Separated	0.4386 (4.4136)	0.6928 (6.0143)	0.1197 (0.8318)	0.3053 (3.1112)	0.1856 (1.07)
Urban Residence	0.0689 (1.6611)	0.5757 (13.2999)	0.5456 (4.9834)	0.2713 (5.2675)	-0.2745 (-2.27)
Babyborn			-0.1866 (-6.2325)	-0.1367 (-8.5476)	0.0499 (1.47)
Disability	-0.2184 (-3.3976)	-0.3300 (-4.2506)	-0.9882 (-4.6586)	-0.5169 (-4.6639)	0.4713 (1.97)
F	119.1075	100.5148	19.1008	32.4055	
R^2	0.2936	0.0594	0.1153	0.0368	
Standard Error	0.7888	2.4438	1.3900	2.1197	
Number of Observations	2,559	14,178	1,383	8,229	

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[a] t-values in parentheses.

Table 23

Personal Characteristics Earnings Equations for Non-White Males and Females in 1970[a]

Dependent Variable: ln E	Non-White Males 1970 (WC) Federal	Non-White Males 1970 (WC) Private	Non-White Females 1970 (WC) Federal	Non-White Females 1970 (WC) Private
Constant	5.5145 (25.4256)	6.7917 (36.0506)	5.2169 (10.6374)	5.2976 (21.0090)
Education	0.0700 (5.0496)	-0.0138 (-1.1499)	0.1148 (4.0426)	0.0917 (5.6612)
Experience	0.0495 (5.0191)	0.0465 (5.6456)	0.0654 (4.1737)	0.0398 (4.4305)
Experience Squared	-0.0008 (-4.0268)	-0.0011 (-7.8316)	-0.0009 (-2.5267)	-0.0006 (-3.6314)
Spouse Present	0.7559 (6.3611)	0.9250 (9.2320)	0.2331 (1.5078)	0.0797 (0.6566)
Spouse Absent	0.1762 (0.7243)	0.3177 (1.4193)	-0.5256 (-1.1790)	-0.0350 (-0.1411)
Widowed	0.7332 (2.5710)	0.8699 (3.6622)	0.2279 (0.8152)	-0.0909 (-0.5199)
Divorced, Separated	0.5908 (3.2071)	0.6622 (4.5356)	-0.0205 (-0.1061)	0.1385 (0.9486)
Urban Residence	0.0328 (0.2246)	0.3313 (4.0244)	0.6998 (2.9061)	0.3067 (3.1044)
Babyborn			-0.0096 (-0.2851)	-0.0291 (-1.6108)
Disability	-0.1283 (-0.8393)	-0.6723 (-4.8894)	-0.8359 (-3.0227)	-0.6477 (-4.1021)
F	16.6482	27.7399	8.1132	9.6164
R^2	0.1555	0.0700	0.0955	0.0329
Standard Error	1.0857	2.0448	1.4647	2.0712
Number of Observations	766	3,199	675	2,534

[a] t-values in parentheses

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highest estimated rate of return to education for private workers is 0.0917 for non-white females and the lowest is -0.0138 for non-white males.

The estimated coefficients of the two experience variables measure the combined effects of the average rate of return to on-the-job training, the proportion of time devoted to on-the-job training at the beginning of work experience, and the length of the investment horizon. The first experience coefficient, which reflects both the rate of return and the proportion of time, is larger for Federal than for private sector workers in every group in both years. This indicates that if Federal and private sector workers initially devote the same proportion of time to on-the-job training, the rate of return to that training is higher in the Federal sector. Alternatively, if the rate of return is the same in both sectors, these results imply that Federal workers devote a larger proportion of time to on-the-job training at the beginning of their work experience. The second experience coefficient reflects these effects as well as the length of the investment horizon. It is also significant at the 5 per cent level in all equations but its relation in the two sectors varies from group to group.

The race and sex variables are negative and significant at the 5 per cent level in all cases. In 1960, each of these coefficients is larger in the private sector when both minorities are present: proportional differentials for race and sex are -0.3768 and -0.5740, respectively, in the private sector and -0.1583 and -0.4387, respectively, in the Federal sector. However, the estimated proportional differential is larger in the Federal sector when only one minority influence is present. In 1970 these proportional differentials are larger in the private sector except for the racial differential for males.

In both years the urban residence variable does not follow the consistent pattern of the overall equations. It is positive, significant at the 5 per cent level, and larger in the private sector for whites, males, and white males in both years. The significance level and relative size of this coefficient varies for non-white and female groups in both years. The size of the coefficient is larger in 1960 for most equations estimated: the largest coefficient estimated in each year is for non-white female Federal workers with a value of 1.3271 in 1960 and 0.6998 in 1970.

The coefficient of the variable BABYB, which measures the effect of work experience lost by the female when she leaves the labor force to care for her young children, is negative and significant at the 5 per cent level in both years for all female groups except non-white females (both Federal and private in both years). It is negative and significant at the 10 per cent level for all non-white female groups in 1960 but not in 1970. The coefficient is larger in the Federal sector for every group of females except non-white females in 1970 (where it is insignificant). This coefficient is largest for white females in both years: in 1960, it is -0.2332 in the Federal sector and -0.1255 in the private sector; in 1970 it is -0.1856 in the Federal sector and -0.1367 in the private sector. These results indicate that each child results in a larger percentage decrease in the earnings of women employed in the Federal sector. This may imply that females employed in the Federal sector leave the labor force for a longer time to care for their children than females in the private sector. This may also result from the stronger influence of experience on earnings in the Federal sector. In both sectors, the coefficient of the BABYB variable is lower for non-white females than for white females. This is consistent with Bowen and Finnegan's finding that the presence of young children generally has a less inhibitive effect on the labor force participation of non-white females.[12]

The disability variable which appears in the equations estimated with the 1970 data is negative and significant at the 5 per cent level for all groups except non-white males. It is significant for this group at the 25 per cent level. The coefficient is larger (in absolute value) in the Federal sector for all female groups and for whites but larger in the private sector for all male groups and non-whites. The coefficient is largest (in absolute value) for white females in the Federal sector with a value of -0.9882 and smallest for non-white males in the Federal sector with a value of -0.1283.

Full-Scale Earnings Equations

When occupational variables are included and the full-scale earnings equations are estimated on the eight race-sex groups for both years, these patterns in the coefficients change somewhat. (Tables 24, 25, 26, and 27 show the regression results for 1960 and Tables 28, 29, 30, and 31 present the results for 1970). In these equations, the significance levels of the education variable drop to insignificance for several groups. The estimated rate of return to education is larger in the private sector for every group in 1960, ranging in size there from 0.0238 for non-white males to 0.0792 for whites. In 1970, however, it remains larger in the Federal sector for every group except females and white females. This implies that the Federal workers captured by the industry classification variable are those whose rate of return is most sensitive to choice of occupation. The experience coefficients remain significant at the 5 per cent level for all groups in both years. The first coefficient is still larger in the Federal sector for all groups except non-white males in 1960. The second coefficient varies among groups in 1960 but in 1970 implies a consistently shorter investment horizon in the Federal sector.

The coefficients of race and sex are reduced when occupational variables are included, since a large portion of race and sex discrimination occurs through occupational discrimination. There is no longer a consistent pattern

Table 24

Full-Scale Earnings Equations for Whites and Non-Whites in 1960[a]

Dependent Variable: ln E	Whites 1960 Federal	 Private	Non-Whites 1960 Federal	 Private
Constant	5.8063 (36.2576)	5.2194 (47.9586)	7.1648 (20.6095)	4.9656 (32.4043)
Education	0.0563 (5.3274)	0.0792 (12.2735)	0.0073 (0.3862)	0.0352 (3.7778)
Experience	0.0614 (10.0596)	0.0353 (9.0050)	0.0610 (4.7720)	0.0517 (8.2438)
Experience Squared	-0.0010 (-7.8753)	-0.0010 (-13.5540)	-0.0010 (-3.9733)	-0.0010 (-9.5189)
Sex	-0.5719 (-9.3379)	-0.1874 (-4.4850)	-0.4210 (-3.9961)	-0.3324 (-5.1622)
Spouse Present	-0.0899 (-1.3210)	0.1601 (3.0803)	0.1966 (1.3149)	0.2211 (2.8810)
Spouse Absent	-0.1091 (-0.5280)	-0.2462 (-1.7766)	-0.1606 (-0.5072)	0.3914 (2.6997)
Widowed	0.1496 (1.0361)	0.1884 (1.8587)	0.1830 (0.6537)	0.2973 (2.1655)
Divorced, Separated	0.2293 (1.9977)	0.2091 (2.2470)	0.1643 (0.8570)	0.1929 (1.8432)
Urban Residence	0.2814 (4.1015)	0.7469 (20.3475)	0.1914 (1.0386)	0.6172 (9.8818)
Professional	0.3413 (5.0714)	0.0322 (0.5168)	0.3225 (1.6812)	0.6257 (4.4265)
Manager	0.2610 (2.8031)	-0.7651 (-11.5750)	0.4123 (0.9047)	-2.5310 (-9.6610)
Craftsmen	0.1485 (1.5661)	0.9285 (16.4587)	0.1965 (1.0341)	0.6650 (5.4215)
Operative	-0.2174 (-1.2305)	0.9418 (17.6610)	-0.0553 (-0.3764)	0.9733 (12.0797)
Laborer	-0.0265 (-0.0691)	0.3612 (3.5658)	-0.3779 (-2.1963)	0.8352 (8.9970)

Table 24--Continued

Dependent Variable: ln E	Whites 1960 Federal	Whites 1960 Private	Non-Whites 1960 Federal	Non-Whites 1960 Private
Service	0.1665 (0.9955)	-0.3513 (-4.3497)	-0.5082 (-3.4087)	0.4586 (5.7324)
F	32.7308	144.1115	5.8624	47.0757
R^2	0.1745	0.0946	0.0987	0.1051
Standard Error	1.1330	2.4833	1.1715	2.0900
Number of Observations	2,253	20,544	667	5,885

[a] t-values in parentheses.

Table 25

Full-Scale Earnings Equations for Males and Females in 1960[a]

Dependent Variable: ln E	Males in 1960 Federal	Males in 1960 Private	Females in 1960 Federal	Females in 1960 Private
Constant	6.7872 (46.2802)	5.1097 (44.1507)	8.7429 (14.0150)	6.5399 (29.0188)
Education	0.0374 (4.7061)	0.0553 (8.2534)	0.0541 (2.2700)	0.0731 (8.3048)
Experience	0.0645 (11.9300)	0.0263 (5.7889)	0.0565 (4.8399)	0.0463 (9.7576)
Experience Squared	-0.0011 (-10.4633)	-0.0009 (-11.3835)	-0.0008 (-2.9878)	-0.0008 (-8.9534)
Race	-0.2664 (-4.8435)	-0.2480 (-4.6408)	0.0200 (0.1585)	-0.3291 (-6.1341)
Spouse Present	0.3493 (5.2014)	0.5191 (8.6365)	-2.5052 (-5.4804)	-0.1762 (-7.3513)
Spouse Absent	0.0881 (0.5296)	0.4654 (3.1624)	-2.4819 (-4.2490)	-1.4644 (-7.2630)
Widowed	0.4222 (2.0765)	0.4917 (3.2638)	-2.2328 (-4.5571)	-1.2044 (-6.8610)
Divorced, Separated	0.3209 (2.6358)	0.2412 (2.1615)	-2.1439 (-4.5325)	-0.8536 (-4.9863)
Urban Residence	0.1930 (3.4012)	0.8961 (21.8448)	0.3425 (2.2021)	0.2783 (5.6627)
Professionals	0.3455 (6.0462)	0.2896 (3.6295)	0.3317 (2.6778)	-0.0752 (-1.0017)
Managers	0.3174 (4.0576)	-0.6350 (-8.6125)	0.0264 (0.1053)	-1.2625 (-9.5346)
Craftsmen	0.1078 (1.6147)	1.0325 (17.7151)	0.2194 (0.4594)	0.2188 (1.0739)
Operatives	0.0269 (0.2755)	1.1479 (19.2255)	-0.7407 (-1.8359)	0.4970 (7.5110)
Laborers	-0.1400 (-1.2562)	0.7656 (9.6317)	-1.4338 (-1.9556)	0.1049 (0.3526)

Table 25--Continued

Dependent Variable: ln E	Males in 1960 Federal	Males in 1960 Private	Females in 1960 Federal	Females in 1960 Private
Service	-0.0279 (-0.3018)	0.4778 (5.0696)	-0.5950 (-2.1702)	-0.4296 (-6.2855)
Babyborn			-0.1824 (-4.8567)	-0.0832 (-6.4141)
F	34.4545	150.6992	8.8700	38.1287
R^2	0.2144	0.1151	0.1045	0.0609
Standard Error	0.8495	2.5343	1.4825	2.1071
Number of Observations	1,840	17,260	1,030	9,169

[a] t-values in parentheses.

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Table 26

Full-Scale Earnings Equations for White Males and Females in 1960^a

Dependent Variable: ln E	White Males in 1960 Federal	White Males in 1960 Private	White Females in 1960 Federal	White Females in 1960 Private
Constant	6.6133 (39.8457)	5.0169 (36.8965)	9.5665 (12.8255)	7.1699 (24.3481)
Education	0.0504 (5.4938)	0.0678 (8.5366)	0.0535 (1.9623)	0.0768 (6.9093)
Experience	0.0592 (11.4892)	0.0222 (4.1894)	0.0510 (4.0047)	0.0522 (9.3510)
Experience Squared	-0.0012 (-10.2667)	-0.0008 (-9.2154)	-0.0006 (-2.2730)	-0.0010 (-0.0871)
Spouse Present	0.2656 (3.5036)	0.5431 (7.5424)	-3.1214 (-5.6900)	-1.7269 (-8.1564)
Spouse Absent	-0.0727 (-0.3614)	0.3442 (1.7192)	-2.7111 (-3.9275)	-2.2534 (-8.5312)
Widowed	0.5205 (2.0966)	0.5158 (2.7446)	-2.8162 (-4.8412)	-1.7289 (-7.5478)
Divorced, Separated	0.2665 (1.5935)	0.2329 (1.5841)	-2.6009 (-4.5298)	-1.3139 (-5.7894)
Urban Residence	0.2324 (3.7860)	0.8971 (19.1383)	0.1782 (1.1046)	0.3032 (5.3497)
Professionals	0.3010 (4.8176)	0.2564 (2.9476)	0.4044 (2.7230)	-0.2780 (-3.3268)
Managers	0.2794 (3.4538)	-0.6024 (-7.6309)	-0.0355 (-0.1394)	-1.1834 (-8.5258)
Craftsmen	0.1065 (1.4406)	1.0764 (16.5363)	0.6646 (0.9034)	0.2555 (1.1343)
Operatives	-0.1290 (-0.9529)	1.1892 (16.8975)	-3.3617 (-3.2106)	0.4833 (6.1442)
Laborers	-0.1355 (-0.4799)	0.5807 (5.2204)		

Table 26--Continued

Dependent Variable: ln E	White Males in 1960		White Females in 1960	
	Federal	Private	Federal	Private
Service	0.2087 (1.6251)	0.1410 (1.0447)	-0.3666 (-0.3525)	-0.7174 (-7.8862)
Babyborn			-0.2312 (-5.1208)	-0.1196 (-6.9285)
F	25.5496	128.8416	8.9198	37.0551
R^2	0.1964	0.1151	0.1160	0.0693
Standard Error	0.8360	2.6147	1.4566	2.1330
Number of Observations	1,407	13,760	846	6,784

[a] t-values in parentheses.

Table 27

Full-Scale Earnings Equations for Non-White Males and Females in 1960[a]

Dependent Variable: ln E	Non-White Males in 1960 Federal	Non-White Males in 1960 Private	Non-White Females in 1960 Federal	Non-White Females in 1960 Private
Constant	7.1406 (22.8580)	4.8976 (24.8893)	6.8057 (5.2531)	5.1135 (14.5690)
Education	-0.0013 (-0.0756)	0.0238 (1.9171)	0.0348 (0.6910)	0.0534 (3.6041)
Experience	0.0482 (3.9522)	0.0502 (5.9399)	0.0909 (3.0673)	0.0476 (5.1947)
Experience Squared	-0.0008 (-3.5428)	-0.0011 (-8.3126)	-0.0015 (-2.3077)	-0.0006 (-3.7996)
Spouse Present	0.6582 (4.5451)	0.3771 (3.7242)	-1.4039 (-1.5726)	-0.2460 (-1.0491)
Spouse Absent	0.4308 (1.4454)	0.5948 (3.0469)	-2.0397 (-1.7858)	-0.0841 (-0.2832)
Widowed	0.5473 (1.5094)	0.3047 (1.3294)	-1.1956 (-1.2130)	-0.2382 (-0.8979)
Divorced, Separated	0.5899 (2.9711)	0.1625 (1.0412)	-1.3792 (-1.5565)	-0.0210 (-0.0846)
Urban Residence	-0.0093 (-0.0645)	0.8488 (10.3862)	1.5558 (1.9489)	0.1460 (1.5123)
Professionals	0.3060 (1.8255)	-0.0353 (-0.1503)	0.3209 (0.6405)	0.9789 (5.6370)
Managers	0.6222 (1.5402)	-2.2985 (-7.4823)	0.2137 (0.1879)	-2.9441 (-5.6094)
Craftsmen	0.2098 (1.3488)	0.7523 (5.4899)	0.0339 (0.0509)	0.0330 (0.0690)
Operatives	0.0192 (0.1290)	1.0932 (10.2731)	-0.4058 (-0.8376)	0.7204 (5.7552)
Laborers	-0.2561 (-1.8598)	0.9082 (8.5031)	-1.3224 (-1.5695)	1.1281 (3.1317)
Service	-0.3012 (-2.1432)	0.8306 (6.7359)	-0.5926 (-1.6892)	0.2074 (2.0571)

Table 27--Continued

Dependent Variable: ln E	Non-White Males in 1960		Non-White Females in 1960	
	Federal	Private	Federal	Private
Babyborn			-0.0361 (-1.1902)	-0.0237 (-1.2613)
F	5.6167	41.3401	2.0823	11.7309
R^2	0.1301	0.1390	0.0652	0.0635
Standard Error	0.8719	2.1495	1.5584	1.9464
Number of Observations	433	3,500	234	2,385

[a] t-values in parentheses.

Table 28

Full-Scale Earnings Equations for Whites and Non-Whites in 1970[a]

Dependent Variable: ln E	Whites (WC) Federal	Whites (WC) Private	Non-Whites (WC) Federal	Non-Whites (WC) Private
Constant	7.1070 (52.6783)	6.3457 (59.7298)	6.6739 (24.7440)	6.0376 (37.1018)
Education	0.0570 (7.6284)	0.0499 (8.0690)	0.0558 (3.6630)	0.0321 (3.2318)
Experience	0.0705 (15.4471)	0.0393 (11.4146)	0.0579 (6.7888)	0.0402 (6.7246)
Experience Squared	-0.0012 (-11.9808)	-0.0010 (-16.0637)	-0.0009 (-4.7357)	-0.0008 (-7.4240)
Sex	-0.5264 (-12.0469)	-0.4656 (-12.4907)	-0.3187 (-4.1196)	-0.5312 (-8.3357)
Spouse Present	0.1656 (3.2077)	0.2927 (6.1068)	0.4428 (4.6994)	0.4860 (6.4117)
Spouse Absent	-0.2429 (-1.8028)	0.2214 (1.7410)	-0.1135 (-0.4984)	0.0397 (0.2407)
Widowed	0.2115 (1.8810)	0.2841 (3.0351)	0.4358 (2.2753)	0.3277 (2.4574)
Divorced, Separated	0.1444 (1.7495)	0.4464 (5.9343)	0.1973 (1.5185)	0.3427 (3.3705)
Urban Residence	0.2403 (5.2120)	0.5235 (15.6750)	0.2924 (2.1968)	0.3774 (5.9902)
Professional	0.2669 (5.6323)	0.0385 (0.7012)	0.2085 (1.8360)	0.7871 (5.4069)
Managers	0.3216 (5.2606)	0.1905 (3.1971)	0.3590 (1.7329)	-0.9618 (-4.7301)
Craftsmen	0.0223 (0.3129)	0.6213 (11.8953)	-0.2259 (-1.6974)	0.5366 (5.0195)
Operatives	-0.0650 (-0.5674)	0.6558 (13.2201)	-0.0281 (-0.1987)	0.6977 (8.8565)
Laborers	-0.5301 (-2.9735)	0.1110 (1.2325)	-0.1501 (-0.9441)	0.5679 (5.3381)

Table 28--Continued

Dependent Variable: ln E	Whites 1970 (WC) Federal	Whites 1970 (WC) Private	Non-Whites 1970 (WC) Federal	Non-Whites 1970 (WC) Private
Service	-0.2736 (-2.5695)	-0.4148 (-6.3995)	-0.4035 (-3.7652)	0.1464 (1.7948)
Disability	-0.4073 (-5.3661)	-0.3632 (-5.7533)	-0.3617 (-2.5130)	-0.6452 (-6.2621)
F	80.5182	110.6493	15.8163	37.3453
R^2	0.2440	0.0726	0.1414	0.0921
Standard Error	1.0578	2.3239	1.2745	2.0428
Number of Observations	3,942	22,407	1,441	5,733

[a] t-values in parentheses.

Table 29

Full-Scale Earnings Equations for Males and Females in 1970[a]

Dependent Variable: ln E	Males 1970 (WC) Federal	Males 1970 (WC) Private	Females 1970 (WC) Federal	Females 1970 (WC) Private
Constant	6.7812 (60.3638)	6.2012 (53.5165)	6.8459 (24.2841)	6.0145 (42.7391)
Education	0.0663 (10.8781)	0.0268 (4.0403)	0.0276 (1.5937)	0.0651 (7.4658)
Experience	0.0569 (16.2312)	0.0335 (8.1595)	0.0722 (8.8084)	0.0503 (11.5097)
Experience Squared	-0.0011 (-12.9705)	-0.0010 (-13.6458)	-0.0012 (-6.5203)	-0.0009 (-11.1780)
Race	-0.2541 (-5.3201)	-0.2011 (-4.0263)	-0.0716 (-0.9899)	-0.1905 (-3.7892)
Spouse Present	0.6194 (12.2324)	0.7738 (13.8942)	0.0582 (0.6871)	-0.0804 (-1.3257)
Spouse Absent	0.2542 (2.0572)	0.4702 (3.2283)	-0.5346 (-2.5071)	-0.0970 (-0.6915)
Widowed	0.7363 (5.3966)	0.4937 (3.3467)	0.1267 (0.8316)	-0.0577 (-0.6192)
Divorced, Separated	0.4539 (5.2468)	0.6323 (6.8476)	0.0465 (0.4086)	0.2291 (2.8405)
Urban Residence	0.0622 (1.4789)	0.5502 (14.3405)	0.6184 (6.1725)	0.3374 (7.3398)
Professionals	0.1822 (4.0830)	0.2480 (3.5619)	0.3443 (3.8287)	0.0699 (0.9507)
Managers	0.2529 (4.5877)	0.3385 (4.9053)	0.3784 (2.4737)	-0.3126 (-2.7605)
Craftsmen	-0.0995 (-1.8674)	0.7119 (12.5367)	0.5562 (1.5027)	0.4567 (3.0805)
Operatives	-0.0386 (-0.5223)	0.8400 (14.0050)	0.0055 (0.0203)	0.4298 (7.2970)

Table 29--Continued

	Males 1970 (WC)		Females 1970 (WC)	
Dependent Variable: ln E	Federal	Private	Federal	Private
Laborers	-0.2331 (-2.6710)	0.5184 (6.3780)	-0.2704 (-0.5036)	-0.0769 (-0.4138)
Service	-0.2170 (-3.0542)	0.1509 (1.7374)	-0.4828 (-3.3404)	-0.4112 (-6.8932)
Babyborn			-0.0965 (-4.3571)	-0.0905 (-7.5803)
Disability	-0.1879 (-3.1001)	-0.3613 (-5.3180)	-0.8882 (-5.2974)	-0.5673 (-6.2750)
F	95.0725	87.1198	17.1436	35.0334
R^2	0.3117	0.0735	0.1177	0.0510
Standard Error	0.8594	2.3613	1.4121	2.0966
Number of Observations	3,325	17,377	2,058	10,763

[a] t-values in parentheses.

Table 30

Full-Scale Earnings Equations for White Males and Females in 1970^a

Dependent Variable: ln E	White Males 1970 (WC) Federal	White Males 1970 (WC) Private	White Females 1970 (WC) Federal	White Females 1970 (WC) Private
Constant	6.6775 (56.9779)	6.1119 (45.3592)	7.3335 (21.8366)	6.2139 (37.2733)
Education	0.0712 (11.1821)	0.0384 (4.9838)	0.0051 (0.2934)	0.0582 (5.5825)
Experience	0.0748 (16.7558)	0.0318 (6.7782)	0.0779 (8.0938)	0.0566 (11.2036)
Experience Squared	-0.0013 (-13.5378)	-0.0010 (-12.0467)	-0.0014 (-6.3805)	-0.0011 (-11.2470)
Spouse Present	0.5625 (10.2258)	0.7293 (11.1545)	-0.0051 (-0.0492)	-0.1225 (-1.7239)
Spouse Absent	0.3227 (2.1886)	0.6062 (3.3391)	-0.5815 (-2.4199)	-0.0717 (-0.4221)
Widowed	0.7645 (4.8718)	0.3407 (1.8892)	0.1026 (0.5659)	-0.0236 (-0.2140)
Divorced, Separated	0.4071 (4.1238)	0.6514 (5.6945)	0.1472 (1.0292)	0.3034 (3.1166)
Urban Residence	0.0604 (1.4693)	0.5924 (13.7558)	0.5423 (4.9689)	0.3229 (6.2338)
Professionals	0.1976 (4.2686)	0.1751 (2.3317)	0.3477 (3.4320)	-0.0654 (-0.8264)
Managers	0.2512 (4.5785)	0.3723 (5.0572)	0.4207 (2.5438)	-0.2402 (-2.0152)
Craftsmen	-0.0186 (-0.3215)	0.7490 (11.8998)	0.3955 (0.6318)	0.3894 (2.3738)
Operatives	-0.1130 (-1.2295)	0.8705 (12.5888)	0.2907 (0.6251)	0.4131 (5.8907)
Laborers	-0.4876 (-3.5401)	0.3423 (3.2921)		

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Table 30--Continued

Dependent Variable: ln E	White Males 1970 (WC) Federal	White Males 1970 (WC) Private	White Females 1970 (WC) Federal	White Females 1970 (WC) Private
Service	-0.0372 (-0.9550)	-0.0224 (-0.1984)	-0.8376 (-2.8541)	-0.6148 (-8.3356)
Babyborn			-0.1770 (-5.9285)	-0.1309 (-8.2423)
Disability	-0.2177 (-3.4143)	-0.2920 (-3.7865)	-0.9509 (-4.5009)	-0.4973 (-4.5226)
F	76.7108	77.3641	14.6376	31.8733
R^2	0.3075	0.0748	0.1289	0.0533
Standard Error	0.7810	2.4238	1.3796	2.1014
Number of Observations	2,559	14,178	1,383	8,229

[a] t-values in parentheses.

Table 31

Full-Scale Earnings Equations for Non-White Males and Females in 1970[a]

Dependent Variable: ln E	Non-White Males 1970 (WC) Federal	Non-White Males 1970 (WC) Private	Non-White Females 1970 (WC) Federal	Non-White Females 1970 (WC) Private
Constant	6.9327 (23.7172)	6.0881 (29.1944)	5.7859 (10.8306)	5.2050 (20.2923)
Education	0.0472 (2.9811)	0.0009 (0.0716)	0.0726 (2.2636)	0.0826 (5.0220)
Experience	0.0492 (5.0102)	0.0443 (5.4373)	0.0655 (4.1451)	0.0408 (4.5705)
Experience Squared	-0.0008 (-4.0629)	-0.0010 (-7.2733)	-0.0009 (-2.5114)	-0.0006 (-3.5775)
Spouse Present	0.7204 (6.0836)	0.8739 (8.7605)	0.2320 (1.5058)	0.0432 (0.3651)
Spouse Absent	0.1666 (0.6901)	0.2250 (1.0169)	-0.4421 (-0.9916)	-0.0729 (-0.2971)
Widowed	0.6772 (2.3891)	0.7940 (3.3826)	0.2081 (0.7419)	-0.1126 (-0.6507)
Divorced, Separated	0.5104 (2.7712)	0.5826 (4.0304)	-0.0126 (-0.0652)	0.1037 (0.7177)
Urban Residence	0.0369 (0.2327)	0.3121 (3.7945)	0.7286 (3.0057)	0.3485 (3.5256)
Professionals	0.1230 (0.9367)	0.6470 (3.0435)	0.3437 (1.7799)	1.0196 (5.0596)
Managers	0.4119 (1.7970)	-0.7486 (-3.0052)	0.1937 (0.5182)	-1.1449 (-3.0982)
Craftsmen	-0.3031 (-2.4405)	0.6338 (4.8124)	0.5363 (1.1308)	0.7392 (2.1553)
Operatives	-0.0036 (-0.0259)	0.8749 (7.2923)	-0.1910 (-0.5455)	0.5796 (5.3145)
Laborers	-0.2014 (-1.3833)	0.73[illegible] (5.5869)		
Service	-0.3568 (-2.7472)	0.4469 (3.2304)	-0.3942 (-2.1829)	0.0213 (0.2110)

Table 31--Continued

Dependent Variable: ln E	Non-White Males 1970 (WC) Federal	Non-White Males 1970 (WC) Private	Non-White Females 1970 (WC) Federal	Non-White Females 1970 (WC) Private
Babyborn			-0.0078 (-0.2324)	-0.0318 (-1.7735)
Disability	-0.0991 (-0.5528)	-0.6074 (-4.4607)	-0.8150 (-2.9541)	-0.6745 (-4.3221)
F	11.4880	23.3035	6.1279	11.1207
R^2	0.1706	0.0947	0.1024	0.0565
Standard Error	1.0760	2.0174	1.4590	2.0457
Number of Observations	766	3,199	675	2,534

[a] t-values in parentheses.

indicating which sector has the greatest discrimination of either type. The significant proportional sex differentials range in size from -0.1874 for whites in the private sector in 1960 to -0.5719 for whites in the Federal sector in 1960. The significant race differentials range in size from -0.1905 for females in the private sector in 1970 to -0.3291 for females in the private sector in 1960.

With the inclusion of the occupational variables, the size of both the disability and babies born variables is also reduced. This reflects the expected condition that the reduction in earnings due to health problems or number of children depends on occupation. The pattern of the disability variable remains the same as in the personal characteristics equations but that of the babies born variable changes.

Although the inclusion of the occupational variables in the equations estimated for the eight race-sex groups does not alter the pattern of the estimated coefficients as much as in the equations for all Federal and all private workers, the same criticism of the occupational variables applies. The personal characteristics equations for the race-sex groups are of greatest interest for studying the comparability of Federal and private workers. One representative equation is considered in detail for each year with respect to the implications of its estimated coefficients. The group to be considered is white females.

Personal Characteristics Equations for White Females

Studying the personal characteristics earnings equations for white females is representative of the analysis which could be made for the other seven race-sex groups. Tables 18 and 22 present these regression results. The significance of the difference between each of the estimated coefficients for Federal and private sector white females is tested on the basis of the statistic[13]

$$t = \frac{\hat{B}_P - \hat{B}_F}{\sqrt{s^2_{\hat{B}_P} + s^2_{\hat{B}_F}}}$$

The differences between these coefficients and their respective t-values are also found in Tables 18 and 22.

The education coefficients in the 1960 equations are consistent with the pattern observed above for all race-sex groups with a rate of return to schooling of 0.0866 in the Federal sector and 0.0470 in the private sector. The difference between the two estimated rates of return is significant at the 10 per cent level. In addition, white females in the Federal sector complete an average of nearly one and one half more years of schooling than their counterparts in the private sector (a mean of 14.468 years in the Federal sector contrasted with a mean of 12.983 years in the private sector). In 1970, however, at 0.0488, the rate of return to education is higher in the private sector than the 0.0408 estimated in the Federal sector but the difference is not significant. The mean years of schooling remains higher in the Federal sector (14.709 years in the Federal sector contrasted with 13.248 years in the private sector).

The experience coefficients in these equations measure the combined effects of the rate of return to on-the-job training, the proportion of time devoted to on-the-job training at the beginning of work experience, and the length of the investment horizon. The first experience coefficient measures the combination of the first two effects and is larger in the Federal sector in both years: it is 0.0514 in 1960 and 0.0831 in 1970 in the Federal sector and 0.0513 in 1960 and 0.0580 in 1970 in the private sector. The difference is significant at the 2.5 per cent level in 1970 but insignificant in 1960. The second experience coefficient is significantly larger (at the 10 per cent level) in the private sector in 1960 but insignificantly larger in the Federal sector in 1970. These results imply that if both Federal and private workers devote the same proportion of time to on-the-job training at the beginning of their work experience, Federal workers earn a higher rate of return and in 1960 they invest for a longer period of time. Alternatively, if both types of workers earn the same rate of return, Federal workers invest more initially.

The effects of the marital status variables vary across equations. In 1960, all of these variables are significant at the 5 per cent level and the differences between them in the two sectors are all significant at the

5 per cent level except the spouse absent variable. The effects of all are consistently greater in the Federal sector. The spouse present variable with a value of -3.1394 in the Federal sector, has the largest effect, reflecting both the alternative of work in the home and the tendency for employers to judge marriage as a sign of divided responsibilities for women. The marital status variables indicate that the earnings of women who are at present, or ever were, married are reduced relative to single, never married individuals and that this effect is greatest in the Federal sector.

In 1970, on the other hand, only the spouse absent variable in the Federal sector and the divorced-separated variable in the private sector are significant at the 5 per cent level. The size of the estimated coefficients is smaller in 1970 than in 1960. This difference may reflect a stronger substitution effect of work in the home in 1960. The marital status variables in 1960 may also be capturing in part the effect of the omitted variable disability. This variable is significant at the 5 per cent level in both equations in 1970; and at -0.9882 in the Federal sector, it is significantly larger than the -0.5169 estimated in the private sector. This may result from better fringe benefits in the Federal sector.

The urban variable is significant at the 5 per cent level in all equations. It is larger in the private sector in 1960 although the difference is not significant. The coefficient is significantly larger in the Federal sector in 1970. This is consistent with the pattern observed for all female groups in 1970--the pecuniary and non-pecuniary benefits of urban residence have a more favorable effect on the earnings of females in the Federal sector. This may result from the presence of Washington, D.C. in the data.

The variable for babies born is significant at the 5 per cent level in all equations. It is significantly larger in the Federal sector at the 5 per cent level in 1960 and at the 10 per cent level in 1970. This larger effect in the Federal sector indicates that the suggested higher rate of return to experience in the Federal sector results in a greater loss of earnings when work experience is interrupted for child care. In 1970, the mean values for babies born are 1.116 for white females in the Federal sector and 1.619 for those in the private sector. In 1960, these mean values are 4.882 in the Federal sector and 4.080 in the private sector. This is a clear indication of changes in the rate of population growth over this period.

The gross Federal-private earnings differential for white females decreased between 1960 and 1970 by 3 per cent from 1.136 to 1.107 in logs. However, the proportion of the differential considered an economic rent increased over that period from 72-74 per cent (estimated with private and Federal regression weights, respectively) in 1960 to 79 per cent in 1970. This is a result of the differences in the estimated coefficients considered above. They indicate

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that the Comparability Doctrine has not been successful in establishing equal earnings for workers of comparable productivity. Instead, it has enabled a Federal-private earnings differential to persist between comparable workers.

Summary and Conclusions

Federal workers as a whole and in every race-sex group in 1960 and 1970 benefit from Federal government employment. The overall differential, as well as the differentials for each of the race-sex groups, decreased over this period. The percentage decrease ranges in size from 2 per cent for white females to 33 per cent for non-white males. This decrease may be attributed to differences in general economic conditions in the two years. More than half of all estimated differentials remains for comparable workers and is considered an economic rent paid to Federal workers. The largest gross differential in both years occurs for white males (a differential of 1.567 in logs in 1960 and 1.265 in logs in 1970). The smallest differential in 1960 is for white females (a differential of 1.136 in logs), while the smallest differential in 1970 is for non-white males (a differential of 0.879 in logs). These results indicate that the Comparability Doctrine has been unsuccessful in establishing equal earnings for workers of comparable productivity. It appears that Federal workers have no need of a comparability policy to improve their position. The policy has, instead, helped the differential Federal workers already enjoyed in 1960 to persist.

Footnotes

[1] All the equations in this thesis are estimated by ordinary least squares using the ECON program written by Morris Norman of the Economics Research Unit, Wharton School of Finance and Commerce, University of Pennsylvania. The mean values calculated in estimating these equations are used to estimate and decompose the gross Federal-private differentials. These values are presented in Appendix A.

[2] The calculated F-statistics for the Chow test for the personal characteristics and full-scale earnings equations are both significant at the 5 per cent level.

[3] These mean values, especially those for private sector workers, are quite low. This is a result of the large numbers of individuals with no income or with very low income contained on both tapes. Since the sample chosen was all civilian members of the labor force 18 years of age and older who were residents of Delaware, Maryland, Virginia, or the District of Columbia, it includes unemployed individuals who would fall into the zero or low earnings categories. Since the largest proportion of these is likely to be in the private sector, this will lower mean private earnings. However, excluding the unemployed from the data used for estimations would be incorrect because it would give earnings an upward bias. Because these means are computed from the natural logarithms of wage rates, they are geometric means:

$$E = \exp \sum_{i=1}^{n} (\ln E_i)/n$$

[4] The significance levels quoted for all t-statistics in this thesis are for one-tailed tests.

[5] This conclusion with respect to the rate of return to on-the-job training is under the assumption that workers in both sectors initially devote the same proportion of their time to on-the-job training.

[6] This point was considered in greater detail in Chapter IV when the methods for dividing the data into Federal and private workers were described.

[7] Harry H. Wellington and Ralph K. Winter, Jr. have argued that public sector unions are inherently more powerful than those in the private sector in their The Unions and the Cities (Washington, D.C.: Brookings Institution, 1971), pp. 29-30. Daniel S. Hamermesh examined this contention and found high earnings effects of certain public sector unions relative to private sector unions for the same occupations in the private sector in his "The Effect

of Government Ownership on Union Wages" (paper presented at the conference on labor in non-profit industry and government, May 7-8, 1973, sponsored by: Industrial Relations Section, Princeton University, Manpower Administration, U.S. Department of Labor), Industrial Relations Section, Princeton University, Working Paper No. 428. (Mimeographed), pp. 28-29. However, whether these tendencies hold for Federal government unions as well as for other public sector unions is very questionable.

[8] This implicitly assumes that the effect of unions on non-union employees is the same in both the Federal government and the private sector.

[9] *Economic Report of the President*, Transmitted to the Congress January 1962, together with *The Annual Report of the Council of Economic Advisers* (Washington, D.C.: U.S. Government Printing Office, 1962), p. 230.

[10] *Economic Report of the President*, Transmitted to the Congress, January 20, 1960 (Washington, D.C.: U.S. Government Printing Office, 1960), p. 9.

[11] *Economic Report of the President*, Transmitted to the Congress, February 1970, together with *The Annual Report of the Council of Economic Advisers* (Washington, DC.: U.S. Government Printing Office, 1970), p. 48.

[12] Bowen and Finnegan, *Labor Force Participation*, pp. 102-105.

[13] It is important to note that this test statistic is constructed under the assumption that the error terms from the regression equations for Federal and private workers are independent and therefore $\text{Cov}\hat{\beta}_F\hat{\beta}_P = 0$. This is a reasonable assumption because in ordinary least squares these equations are estimated independently.

CHAPTER VI

WAGE REGRESSIONS AND DIFFERENTIALS

Wage regressions and differentials between Federal government and private sector workers are analyzed to determine whether the earnings differentials estimated in Chapter V result primarily from differences in non-pecuniary benefits between the two sectors. Because annual earnings are affected by the number of hours and weeks worked during the year while hourly wage rates are not, earnings differentials reflect differences in certain non-pecuniary benefits in the two sectors but wage rate differentials largely represent pecuniary differences.

Since the wage rate equations and differentials are estimated for the same groups as the earnings equations and differentials, there is no detailed discussion of the results. Points of comparison and contrast are noted as they relate to the influence of non-pecuniary benefits on the Federal-private earnings differential. Conclusions are again drawn concerning the success of the Comparability Doctrine.

Overall Federal-Private Wage Differentials[1]

It is frequently asserted that a major benefit of Federal employment is the greater advantage enjoyed in such non-pecuniary benefits as hours worked, stability of employment, and intensity of work effort. Because annual earnings are influenced by the number of hours and weeks worked, the

Table 32

Analysis of Wage Differentials from Overall Personal Characteristics Wage Equations

	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	1960		1970 (WC)	
	ln $\overline{W}_F$= 0.826	$\overline{W}_F$=\$2.28	ln $\overline{W}_F$=1.302	$\overline{W}_F$-\$3.68
	ln $\overline{W}_P$=-0.378	$\overline{W}_P$=\$ .69	ln $\overline{W}_P$=0.304	$\overline{W}_P$=\$1.36
	ln(G+1)=1.204		ln(G+1)=0.998	
Due to Differences in Characteristics	0.2367	0.2272	0.2517	0.1751
Economic Rent	0.9673	0.9768	0.7463	0.8229
	1970 (INDUS)		Non-Professionals 1970(WC)	
	ln $\overline{W}_F$=1.366	$\overline{W}_F$=\$3.92	ln $\overline{W}_F$=1.132	$\overline{W}_F$=\$3.10
	ln $\overline{W}_P$=0.407	$\overline{W}_P$=\$1.50	ln $\overline{W}_P$=0.281	$\overline{W}_P$=\$1.32
	ln(G+1)=0.959		ln(G+1)=0.851	
Due to Differences in Characteristics	0.2441	0.2445	0.1398	0.1652
Economic Rent	0.7149	0.7145	0.7112	0.6858

Table 33

Analysis of Wage Differentials from Overall Full-Scale Wage Equations

	Federal Regression Weights.	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	1960		1970 (WC)	
	$\ln \overline{W}_F = 0.826$	$\overline{W}_F=\$2.28$	$\ln \overline{W}_F=1.302$	$\overline{W}_F=\$3.68$
	$\ln \overline{W}_P=-0.378$	$\overline{W}_P=\$\ .69$	$\ln \overline{W}_P=0.304$	$\overline{W}_P=\$1.36$
	$\ln(G+1)=1.204$		$\ln(G+1)=0.998$	
Due to Difference in Characteristics	0.2368	0.1612	0.2581	0.0509
Economic Rent	0.9672	1.0428	0.7399	0.9471
	1970 (INDUS)		Non-Professionals 1970(WC)	
	$\ln \overline{W}_F=1.366$	$\overline{W}_F=\$3.92$	$\ln \overline{W}_F=1.132$	$\overline{W}_F=\$3.10$
	$\ln \overline{W}_P=0.407$	$\overline{W}_P=\$1.50$	$\ln \overline{W}_P=0.281$	$\overline{W}_P=\$1.32$
	$\ln(G+1)=0.959$		$\ln(G+1)=0.851$	
Due to Differences in Characteristics	0.3429	0.1286	0.1951	0.0739
Economic Rent	0.6161	0.8304	0.6559	0.7711

estimated earnings differentials reflect some of the differences in non-pecuniary benefits between the two sectors. It is possible that these earnings differentials are primarily due to such non-pecuniary differences. This is examined through a comparison of the earnings differentials with pay differentials which do not reflect these non-pecuniary differences. The hourly wage rate is the pay measure used. Since there is no information in the data on wage rates, an estimate is made from the information on yearly earnings, weeks worked during the year preceding the census, and hours worked during the census reference week in the manner described in Chapter IV.[1]

Both sets of wage rate equations (personal characteristics and full-scale) are estimated separately for all Federal and all private workers in the four large sets of data using specifications similar to those employed in the earnings regressions. Again coefficients are not estimated in the following cases: 1) the characteristic serves as the base group; 2) there are no observations in the cell; 3) the variable is omitted because of poor results in earlier regressions. Table 6 in Chapter IV presents the personal characteristics regressions for the first three data sets--1960, 1970 (WC), and 1970 (INDUS)--and Table 7 shows the full-scale regressions. The corresponding equations for the fourth data set (non-professional workers) are found in Tables 35 and 36.[2]

In all four data sets the mean wage rates of Federal workers exceed the mean wage rates of private workers.[3] Tables 32 and 33 present the analyses of these differentials. Like the earnings differential, the overall Federal-private wage differential fell between 1960 and 1970 but by a smaller percentage--by approximately 17 per cent from 1.204 (in logs) to 0.998 (in logs) instead of 23 per cent. However, an even larger proportion of each of these overall differentials--at least 75 per cent based on the personal characteristics equations--remains between comparable workers and is considered an economic rent paid to Federal workers. The gross differential for non-professional workers of 0.851 (in logs) is also the smallest of the four estimated but the proportion which is an economic rent is the largest--81 per cent when private regression weights are used and 84 per cent when Federal regression weights are used in the analysis based on the personal characteristics equations. Like the earnings differentials, the absolute wage rate differential rose from $1.59 in 1960 to $2.32 in 1970. However, the proportional differentials again are preferred for examination because they facilitate comparisons across groups and between years.

That the estimated overall Federal-private wage differentials are smaller than the earnings differentials is expected on the basis that earnings differentials reflect certain non-pecuniary differences between the two sectors while wage differentials do not. The principal non-pecuniary benefit which affects the size of the earnings differential is stability of employment. A proxy for the difference in stability of employment between the two sectors is the difference in the mean number of weeks worked during the year. A comparison of these figures for the four data sets in Table 34 indicates that there is a basis for asserting that Federal workers enjoy greater stability of employment than their private sector counterparts.

Table 34

Weeks Worked by Sector

	Federal	Private
1960	48.592	44.463
1970 (WC)	48.290	45.455
1970 (INDUS)	48.719	45.146
Non-prof.	47.912	45.357

Although the Federal-private pay differential falls when the influence of greater stability of employment in the Federal sector is removed, a proportional differential remains which is largely unattributable to differences in productivity between the two types of workers and which is considered an economic rent paid to Federal workers. The economic rent estimated in the earnings differentials represents both a pecuniary and non-pecuniary advantage enjoyed by Federal workers over their counterparts in the private sector while that estimated in the wage differentials represents primarily a pecuniary advantage.

Stability of employment within the year is only one of the non-pecuniary benefits allegedly associated with Federal employment. However, it is the only such benefit for which a fairly direct measure of relative differences is available. There is no direct measure available for differences in intensity of work effort or stability of employment over many years. The relationship between Federal-private pay differentials and differences in the stability of employment within the year is examined as a representation of the relationship with all non-pecuniary benefits.

To examine the comparability of Federal and private sector workers on both pecuniary and non-pecuniary grounds, the earnings and wage rate differentials by race-sex group should be compared. Brief consideration is given first to the regression results of the overall wage rate equations.

Personal Characteristics Wage Equations

The patterns observed in the estimated coefficients are very similar to those in the earnings equations. The principal difference is in the pattern of the coefficients of the race and sex variables. The extimated proportional differentials are consistently larger in the Federal sector in all four data sets. The racial differentials range in size from -0.2330 to -0.2488 in the Federal sector and from -0.0968 to -0.1715 in the private sector. The sex differentials range in size from -0.3494 to -0.4962 in the Federal sector and from -0.0363 to -0.3544 in the private sector. All are significant at the 5 per cent level except the coefficient of sex in the private sector in 1960 which is significant at the 10 per cent level. The earnings

Table 35

Personal Characteristics Wage Equation for Non-Professionals[a]

		Non-Professional 1970 (WC)	
Dependent Variable: ln W	All Workers	Federal	Private
Constant	-0.7334 (-9.8353)	-0.5116 (-3.7424)	-0.4449 (-5.3343)
Education	0.0554 (12.0002)	0.0753 (9.5108)	0.0348 (6.7100)
Experience	0.0296 (10.5982)	0.0446 (9.0660)	0.0216 (6.9439)
Experience Squared	-0.0007 (-13.7656)	-0.0007 (-6.6074)	-0.0006 (-10.9599)
Race	-0.1131 (-3.6625)	-0.2339 (-5.5075)	-0.1563 (-4.4053)
Sex	-0.3555 (-13.2722)	-0.3627 (-8.9163)	-0.3544 (-11.7964)
Spouse Present	0.1836 (4.8462)	0.2118 (3.7711)	0.2038 (4.7812)
Spouse Absent	-0.0556 (-0.5947)	-0.3362 (-2.4790)	-0.0018 (-0.0168)
Widowed	0.1520 (2.1096)	0.2178 (1.8812)	0.1906 (2.3782)
Divorced, Separated	0.1397 (2.4956)	0.0580 (0.7103)	0.1832 (2.9036)
Urban Residence	0.5010 (17.9863)	0.2579 (4.6350)	0.4663 (15.3330)
Disability	-0.3003 (-5.9892)	-0.3884 (-4.7255)	-0.2791 (-5.0259)
F	115.4440	51.8330	80.5342
R^2	0.0421	0.1298	0.0339
Standard Error	2.1352	1.1639	2.2293

Table 35--Continued

Dependent Variable: ln W	All Workers	Non-Professional 1970 (WC) Federal	Non-Professional 1970 (WC) Private
Number of Observations	28,656	3,749	24,907

[a] t-values in parentheses

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Table 36

Full-Scale Wage Equation for Non-Professionals[a]

Dependent Variable: ln W	All Workers	Non-Professional 1970 (WC) Federal	Private
Constant	-1.2433 (-14.6365)	-0.1759 (-1.1527)	-1.1487 (-12.2403)
Education	0.0779 (15.7600)	0.0532 (6.0603)	0.0620 (11.2937)
Experience	0.0294 (10.4922)	0.0430 (8.7382)	0.0206 (6.6020)
Experience Squared	-0.0007 (-12.6951)	-0.0007 (-6.5223)	-0.0005 (-9.4984)
Race	-0.1064 (-3.3833)	-0.1752 (-4.0105)	-0.1560 (-4.3310)
Sex	-0.2117 (-6.9152)	-0.3601 (-7.7247)	-0.1527 (-4.4446)
Spouse Present	0.1572 (4.1501)	0.2007 (3.5850)	0.1641 (3.8568)
Spouse Absent	-0.0347 (-0.9100)	-0.3232 (-2.3936)	-0.0478 (-0.4568)
Widowed	0.1186 (1.6538)	0.2177 (1.8876)	0.1373 (1.7249)
Divorced, Separated	0.1217 (2.1840)	0.0502 (0.6171)	0.1528 (2.4375)
Urban Residence	0.5453 (19.5811)	0.2471 (4.4545)	0.5122 (16.8861)
Professional			
Manager	-0.1096 (-2.1942)	0.2834 (4.4405)	-0.0949 (-1.6343)
Sales	-0.1248 (-2.4225)	-0.4328 (-1.6619)	0.0966 (1.7265)

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Table 35--Continued

Dependent Variable: ln W	All Workers	Non-Professional 1970 (WC) Federal	Non-Professional 1970 (WC) Private
Craftsmen	0.3940 (9.0363)	-0.0888 (-1.3118)	0.5828 (11.8010)
Operatives	0.4458 (11.3003)	-0.0700 (-0.7709)	0.6323 (14.4120)
Laborers	0.3316 (5.2676)	-0.2020 (-1.7528)	0.5042 (7.2601)
Service	-0.2477 (-5.4128)	-0.2708 (-3.6345)	-0.1316 (-2.5574)
Disability	-0.2774 (-5.5600)	-0.3733 (-4.5603)	-0.2494 (-4.5237)
F	95.6959	36.5512	77.5585
R^2	0.0532	0.1389	0.0497
Standard Error	2.1228	1.1578	2.2116
Number of Observations	28,656	3,749	24,907

[a] t-values in parentheses

equations differ in the sex differential which is larger in the private sector for all 1970 data sets. This suggests that the greater number of weeks worked on average by females in the Federal sector offsets the stronger discrimination there in terms of base pay so that over the year, the effect on earnings of discrimination by sex is larger in the private sector.

Full-Scale Wage Equations

When occupational variables are included and the full-scale wage equations are estimated, the pattern of the coefficients is altered but not as extensively as in the earnings equations. The principal differences between the full-scale wage and earnings equations are in the patterns of the rate of return to education and in the proportional race and sex differentials. With the inclusion of the occupational variables, the estimated rate of return to education in the wage equations falls in the Federal sector and rises in the private sector so that it is greater in the private sector for the 1960 equations and for the non-professional equations. (In the full-scale earnings equations, the rate of return to education is higher in the private sector for all data sets except the 1970 data divided by the industry classification variable). This suggests that the effect of education on pay is more sensitive with respect to occupational choice over a longer period such as a year than in terms of the base rate.

The estimated race and sex differentials follow the pattern of those estimated in the personal characteristics wage equations: both are larger in the Federal sector. The racial differential in the Federal sector ranges in size from -0.1555 to -0.1752 and the sex differential there ranges from -0.3038 to -0.4401.[4]

Although the inclusion of the occupational variables does not alter the pattern of the estimated coefficients of the wage equations to the extent that occurs in the earnings equations, the same criticisms apply to their use for the purposes of this study. The most meaningful equations and differentials to examine to study the comparability of Federal and private workers are the personal characteristics specifications by race and sex group.

Federal Wage Differentials by Race and Sex

Both sets of wage equations (personal characteristics and full-scale) are estimated on the eight race-sex groups of Federal and private workers in the 1960 data and the 1970 data divided by the work class variable with specifications similar to those for the earnings equations. Coefficients are not estimated for the following reasons: 1) the characteristic serves as the base group; 2) there are no observations in the cell; 3) the variable is omitted because of poor results in earlier regressions. Tables 37 and 38 represent the analyses of the wage-rate differentials on the basis of these equations.

The mean wage rates of Federal workers are greater than those of private workers in every race-sex group in both

Table 37

Analysis of Wage Differentials from the Personal Characteristics Wage Equations by Race and Sex

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Whites		Whites	
	ln $\overline{W}_F$=0.903	$\overline{W}_F$=\$2.48	ln $\overline{W}_F$=1.431	$\overline{W}_F$=\$4.18
	ln $\overline{W}_P$=-0.351	$\overline{W}_P$=\$ .70	ln $\overline{W}_P$=0.350	$\overline{W}_P$=\$1.42
	ln(G+1)=1.259		ln(G+1)=1.081	
Due to Differences in Characteristics	0.2276	0.2214	0.2472	0.1538
Economic Rent	1.0314	1.0376	0.8338	0.9272
	Non-Whites		Non-Whites	
	ln $\overline{W}_F$=0.548	$\overline{W}_F$=\$1.73	ln $\overline{W}_F$=0.947	$\overline{W}_F$=\$2.58
	ln $\overline{W}_P$=-0.471	$\overline{W}_P$=\$ .62	ln $\overline{W}_P$=0.125	$\overline{W}_P$=\$1.33
	ln(G+1)=1.019		ln(G+1)=0.822	
Due to Differences in Characteristics	0.2007	0.2028	0.2098	0.1217
Economic Rent	0.8183	0.8162	0.6122	0.7003
	Males		Males	
	ln $\overline{W}_F$=1.010	$\overline{W}_F$=\$2.75	ln $\overline{W}_F$=1.510	$\overline{W}_F$=\$4.53
	ln $\overline{W}_P$=-0.394	$\overline{W}_P$=\$ .67	ln $\overline{W}_P$=0.409	$\overline{W}_P$=\$1.51
	ln(G+1)=1.404		ln(G+1)=1.101	
Due to Differences in Characteristics	0.2848	0.2316	0.2635	0.1496
Economic Rent	1.1192	1.1724	0.8375	0.9514

Table 37--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Females		Females	
	$\ln \overline{W}_F=0.513$	$\overline{W}_F=\$1.67$	$\ln \overline{W}_F=0.966$	$\overline{W}_F=\$2.63$
	$\ln \overline{W}_P=-0.347$	$\overline{W}_P=\$\ .71$	$\ln \overline{W}_P=0.135$	$\overline{W}_P=\$1.15$
	$\ln(G+1)=0.860$		$\ln(G+1)=0.831$	
Due to Differences in Characteristics	0.2959	0.1984	0.2477	0.1837
Economic Rent	0.5641	0.6616	0.5833	0.6473
	White Males		White Males	
	$\ln \overline{W}_F=1.118$	$\overline{W}_F=\$3.06$	$\ln \overline{W}_F=1.640$	$\overline{W}_F=\$5.16$
	$\ln \overline{W}_P=-0.389$	$\overline{W}_P=\$\ .68$	$\ln \overline{W}_P=0.435$	$\overline{W}_P=\$1.55$
	$\ln(G+1)=1.507$		$\ln(G+1)=1.205$	
Due to Differences in Characteristics	0.3414	0.1603	0.3703	0.2046
Economic Rent	1.1656	1.3467	0.8347	1.0004
	White Females		White Females	
	$\ln \overline{W}_F=0.560$	$\overline{W}_F=\$1.75$	$\ln \overline{W}_F=1.046$	$\overline{W}_F=\$2.85$
	$\ln \overline{W}_P=-0.274$	$\overline{W}_P=\$\ .76$	$\ln \overline{W}_P=0.204$	$\overline{W}_P=\$1.23$
	$\ln(G+1)=0.834$		$\ln(G+1)=0.842$	
Due to Differences in Characteristics	0.2711	1.1713	0.2077	0.2266
Economic Rent	0.5629	-0.3373	0.6343	0.6154

Table 37--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Non-White Males		Non-White Males	
	$\ln \overline{W}_F = 0.659$	$\overline{W}_F = \$1.93$	$\ln \overline{W}_F = 1.075$	$\overline{W}_F = \$2.93$
	$\ln \overline{W}_P = -0.414$	$\overline{W}_P = \$ .66$	$\ln \overline{W}_P = 0.295$	$\overline{W}_P = \$1.34$
	$\ln(G+1) = 1.073$		$\ln(G+1) = 0.780$	
Due to Differences in Characteristics	0.1116	0.2036	0.1592	0.0779
Economic Rent	0.9614	0.8694	0.6208	0.7021
	Non-White Females		Non-White Females	
	$\ln \overline{W}_F = 0.342$	$\overline{W}_F = \$1.41$	$\ln \overline{W}_F = 0.802$	$\overline{W}_F = \$2.23$
	$\ln \overline{W}_P = -0.553$	$\overline{W}_P = \$ .58$	$\ln \overline{W}_P = -0.089$	$\overline{W}_P = \$ .92$
	$\ln(G+1) = 0.895$		$\ln(G+1) = 0.891$	
Due to Differences in Characteristics	0.5442	0.0841	0.2758	0.1268
Economic Rent	0.3508	0.8109	0.6152	0.7642

Table 33

Analysis of Wage Differentials from Full-Scale Wage Equations by Race and Sex

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Whites		**Whites**	
	$\ln \overline{W}_F = 0.908$	$\overline{W}_F = \$2.48$	$\ln \overline{W}_F = 1.431$	$\overline{W}_F = \$4.18$
	$\ln \overline{W}_P = -0.351$	$\overline{W}_P = \$ .70$	$\ln \overline{W}_P = 0.350$	$\overline{W}_P = \$1.42$
	$\ln(G+1) = 1.259$		$\ln(G+1) = 1.081$	
Due to Differences in Characteristics	0.2563	0.1888	0.3048	0.0882
Economic Rent	1.0027	1.0702	0.7762	0.9928
	Non-Whites		**Non-Whites**	
	$\ln \overline{W}_F = 0.548$	$\overline{W}_F = \$1.73$	$\ln \overline{W}_F = 0.947$	$\overline{W}_F = \$2.58$
	$\ln \overline{W}_P = -0.471$	$\overline{W}_P = \$ .62$	$\ln \overline{W}_P = 0.125$	$\overline{W}_P = \$1.13$
	$\ln(G+1) = 1.019$		$\ln(G+1) = 0.822$	
Due to Differences in Characteristics	0.1189	0.0668	0.1531	0.0091
Economic Rent	0.9001	0.9522	0.6689	0.8129
	Males		**Males**	
	$\ln \overline{W}_F = 1.010$	$\overline{W}_F = \$2.75$	$\ln \overline{W}_F = 1.510$	$\overline{W}_F = \$4.53$
	$\ln \overline{W}_P = -0.394$	$\overline{W}_P = \$ .67$	$\ln \overline{W}_P = 0.409$	$\overline{W}_P = \$1.51$
	$\ln(G+1) = 1.404$		$\ln(G+1) = 1.101$	
Due to Differences in Characteristics	0.2771	0.3388	0.3031	0.0401
Economic Rent	1.1269	1.0652	0.7979	1.0609

Table 38--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Females		Females	
	$\ln \overline{W}_F = 0.513$	$\overline{W}_F = \$1.67$	$\ln \overline{W}_F = 0.966$	$\overline{W}_F = \$2.63$
	$\ln \overline{W}_P = -0.347$	$\overline{W}_P = \$\ .71$	$\ln \overline{W}_P = 0.135$	$\overline{W}_P = \$1.15$
	$\ln(G+1) = 0.860$		$\ln(G+1) = 0.831$	
Due to Differences in Characteristics	0.3749	0.1486	0.2370	0.1998
Economic Rent	0.4851	0.7114	0.5940	0.6312
	White Males		White Males	
	$\ln \overline{W}_F = 1.118$	$\overline{W}_F = \$3.06$	$\ln \overline{W}_F = 1.640$	$\overline{W}_F = \$5.16$
	$\ln \overline{W}_P = -0.389$	$\overline{W}_P = \$\ .68$	$\ln \overline{W}_P = 0.435$	$\overline{W}_P = \$1.55$
	$\ln(G+1) = 1.507$		$\ln(G+1) = 1.205$	
Due to Differences in Characteristics	0.3554	0.1923	0.3573	0.0856
Economic Rent	1.1516	1.3147	0.8477	1.1194
	White Females		White Females	
	$\ln \overline{W}_F = 0.560$	$\overline{W}_F = \$1.75$	$\ln \overline{W}_F = 1.046$	$\overline{W}_F = \$2.85$
	$\ln \overline{W}_P = -0.274$	$\overline{W}_P = \$\ .76$	$\ln \overline{W}_P = 0.204$	$\overline{W}_P = \$1.23$
	$\ln(G+1) = 0.834$		$\ln(G+1) = 0.842$	
Due to Differences in Characteristics	0.7763	0.2393	0.2661	0.2319
Economic Rent	0.0577	0.5947	0.5759	0.6101

Table 33--Continued

	1960		1970	
	Federal Regression Weights	Private Regression Weights	Federal Regression Weights	Private Regression Weights
	Non-White Males		Non-White Males	
	$\ln \overline{W}_F = 0.659$	$\overline{W}_F = \$1.93$	$\ln \overline{W}_F = 1.075$	$\overline{W}_F = \$2.93$
	$\ln \overline{W}_P = -0.414$	$\overline{W}_P = \$ .66$	$\ln \overline{W}_P = 0.295$	$\overline{W}_P = \$1.34$
	$\ln(G+1) = 1.073$		$\ln(G+1) = 0.780$	
Due to Differences in Characteristics	0.0617	0.0619	0.1470	-0.0920
Economic Rent	1.0113	1.0111	0.6330	0.8720
	Non-White Females		Non-White Females	
	$\ln \overline{W}_F = 0.342$	$\overline{W}_F = \$1.41$	$\ln \overline{W}_F = 0.802$	$\overline{W}_F = \$2.23$
	$\ln \overline{W}_P = -0.553$	$\overline{W}_P = \$ .58$	$\ln \overline{W}_P = -0.089$	$\overline{W}_P = \$ .92$
	$\ln(G+1) = 0.895$		$\ln(G+1) = 0.891$	
Due to Differences in Characteristics	0.3655	-0.0907	0.3094	0.1032
Economic Rent	0.5295	0.9857	0.5816	0.7878

years. Like the earnings differentials, the largest gross wage rate differential in both years is for white males (1.507 in logs in 1960 and 1.205 in logs in 1970). Similarly, the smallest gross differential in 1960 is for white females (0.234 in logs) and in 1970 for non-white males (0.780 in logs). These differentials are smaller than the earnings differentials for the same race-sex groups indicating that part of the gross earnings differential for each race-sex group does reflect the greater non-pecuniary benefits enjoyed by Federal workers, specifically their greater stability of employment. However, there is still a substantial differential for each race-sex group. More than half of this differential remains between comparable workers in each group and is considered an economic rent paid to Federal workers.[5] This implies that in addition to their non-pecuniary advantage, Federal workers in every race-sex group enjoy a pecuniary advantage over their counterparts in the private sector.

These differentials decrease between 1960 and 1970 for every race-sex group except white females. The percentage decreases range in size from 4 per cent for non-white females to 27 per cent for non-white males. The differential for white females increases by 1 per cent between 1960 and 1970. Like the decrease in the earnings differential over this period, these changes in the wage rate differentials probably reflect changes in general economic conditions over the decade and differences in the effect of inflation on real wages in the two sectors.

Personal Characteristics Wage Equations

The patterns in the estimated coefficients of the wage equations for the race-sex groups in 1960 and 1970 are similar to those observed in the earnings equations. (Tables 39, 40, 41, and 42 present these results in 1960 and Tables 43, 44, 45, and 46 show them in 1970). The rate of return is higher in the Federal sector for every group except nonwhite males in 1960. The pattern of the experience coefficients is also similar to that observed in the earnings equations: they imply that if both Federal and private workers initially devote the same proportion of time to on-the-job training, the rate of return is consistently higher in the Federal sector.

The principal differences from the earnings regressions which emerge in these wage regressions are in the estimated race and sex differentials and the effect of the BABYB variable. In both years, these differentials are larger in the Federal sector when only one minority influence is present: that is, discrimination is stronger against nonwhite males and white females in the Federal sector. In 1960, the racial differential is smaller in the Federal sector when both minority influences are present and in 1970 both differentials are smaller in the Federal sector when both minority influences are present. All the race and sex differentials are smaller than those estimated in

Table 39

Personal Characteristics Wage Equations for Whites and Non-Whites in 1960[a]

Dependent Variable: ln W	Whites in 1960 Federal	Whites in 1960 Private	Non-Whites in 1960 Federal	Non-Whites in 1960 Private
Constant	-0.6945 (-4.4432)	-0.6412 (-6.6447)	-0.4042 (-1.3886)	-1.0201 (-7.0141)
Education	0.0767 (9.3279)	0.0056 (1.0079)	0.0402 (2.5744)	0.0055 (0.6056)
Experience	0.0427 (7.3633)	0.0100 (2.4660)	0.0303 (2.5247)	0.0272 (4.1771)
Experience Squared	-0.0006 (-5.1803)	-0.0007 (-9.1071)	-0.0005 (-1.9934)	-0.0005 (-5.9534)
Sex	-0.5397 (-10.3623)	0.0151 (0.3791)	-0.3338 (-3.4830)	-0.2005 (-3.3104)
Spouse Present	-0.1157 (-1.7822)	0.0699 (1.3060)	0.1145 (0.8113)	0.1602 (2.0208)
Spouse Absent	-0.1687 (-0.8581)	-0.3523 (-2.4607)	-0.1730 (-0.5808)	0.3102 (2.0608)
Widowed	0.0482 (0.3499)	0.0872 (0.8327)	0.0350 (0.1336)	0.1392 (0.9767)
Divorced, Separated	0.1557 (1.4237)	0.1299 (1.3525)	0.0822 (0.4543)	0.1036 (0.9539)
Urban Residence	0.2329 (3.5700)	0.6950 (18.3431)	0.1188 (0.7224)	0.4323 (6.7084)
F	37.4944	103.8022	3.4995	14.7673
R^2	0.1273	0.0431	0.0327	0.0206
Standard Error	1.0811	2.5701	-1.3886	2.1716
Number of Observations	2,253	20,544	667	5,885

[a] t-values in parentheses.

Table 40

Personal Characteristics Wage Equations for Males and Females in 1960[a]

Dependent Variable: ln W	Males in 1960 Federal	Males in 1960 Private	Females in 1960 Federal	Females in 1960 Private
Constant	-0.7124 (-5.5365)	-0.4328 (-4.0811)	0.5741 (0.9931)	-0.4306 (-1.9176)
Education	0.0600 (9.5334)	-0.0231 (-3.8291)	0.0930 (4.6182)	0.0481 (5.2520)
Experience	0.0480 (9.1328)	0.0002 (0.0366)	0.0303 (2.7783)	0.0192 (3.9709)
Experience Squared	-0.0008 (-7.3864)	-0.0005 (-7.0465)	-0.0003 (-1.3606)	-0.0004 (-4.7797)
Race	-0.3015 (-6.0459)	-0.0867 (-1.6356)	-0.1014 (-0.9421)	-0.1807 (-3.3446)
Spouse Present	0.2294 (3.5099)	0.2758 (4.4599)	-2.0313 (-4.7430)	-0.5931 (-3.6374)
Spouse Absent	-0.0008 (-0.0050)	0.1914 (1.2492)	-1.9562 (-3.5967)	-0.9193 (-4.4724)
Widowed	0.2640 (1.3324)	0.3228 (2.0003)	-1.8171 (-3.9637)	-0.7361 (-4.1146)
Divorced, Separated	0.2164 (1.8257)	0.2332 (2.0091)	-1.6971 (-3.3321)	-0.4824 (-2.7673)
Urban Residence	0.1648 (2.9783)	0.8881 (20.9117)	0.2935 (2.0319)	0.1397 (2.7954)
Babyborn			-0.1442 (-4.0963)	-0.0475 (-3.5971)
F	37.7868	107.8203	8.7183	19.1419
R^2	0.1526	0.0528	0.0668	0.0194
Standard Error	0.8301	2.6336	1.3997	2.1530
Number of Observations	1,840	17,260	1,080	9,159

[a] t-values in parentheses.

Table 41

Personal Characteristics Wage Equations for White Males and Females in 1960[a]

Dependent Variable: ln W	White Males in 1960 Federal	White Males in 1960 Private	White Females in 1960 Federal	White Females in 1960 Private	ΔB
Constant	-0.8797 (-6.2433)	-0.4074 (-3.3581)	1.1251 (1.6128)	-0.1067 (-0.3706)	-1.2318 (-1.63)
Education	0.0704 (9.9569)	-0.0203 (-2.9239)	0.0859 (3.5759)	0.0523 (5.5763)	-0.0336 (-1.30)
Experience	0.0527 (8.9336)	-0.0039 (-0.7067)	0.0276 (2.2917)	0.0242 (4.2783)	-0.0034 (-0.27)
Experience Squared	-0.0009 (-7.4763)	-0.0005 (-5.6992)	-0.0002 (-0.7604)	-0.0006 (-5.8204)	-0.0004 (-1.33)
Spouse Present	0.1576 (2.1435)	0.2962 (3.9687)	-2.4044 (-4.6373)	-0.9310 (-4.5762)	3.3854 (6.04)
Spouse Absent	-0.2334 (-1.1924)	0.0347 (0.1658)	-1.9423 (-2.9702)	-1.5736 (-5.8990)	0.3635 (0.51)
Widowed	0.3367 (1.3900)	0.3812 (1.9432)	-2.1798 (-3.9583)	-1.1025 (-4.7556)	1.0773 (1.80)
Divorced, Separated	0.2152 (1.3259)	0.2993 (1.9503)	-1.9949 (-3.6711)	-0.8262 (-3.6001)	1.1687 (2.35)
Urban Residence	0.2063 (3.4450)	0.8967 (18.3928)	0.2044 (1.3613)	0.2443 (4.2678)	0.0399 (0.25)
Babyborn			-0.1750 (-4.0938)	-0.0730 (-4.1790)	0.1020 (2.21)
F	29.6629	99.8395	8.2944	24.7317	
R^2	0.1402	0.0543	0.0721	0.0305	
Standard Error	0.8181	2.7333	1.3890	2.1734	
Number of Observations	1,407	13,760	846	6,734	

[a] t-values in parentheses.

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Table 42

Personal Characteristics Wage Equations for Non-White Males and Females in 1960[a]

Dependent Variable: ln W	Non-White Males in 1960 Federal	Non-White Males in 1960 Private	Non-White Females in 1960 Federal	Non-White Females in 1960 Private
Constant	-0.4531 (-1.6691)	-0.7554 (-4.0519)	-0.5358 (-0.4664)	-1.3367 (-3.8307)
Education	0.0276 (1.9413)	-0.0230 (-2.3657)	0.0807 (2.0384)	0.0523 (3.7772)
Experience	0.0288 (2.4449)	0.0230 (2.6523)	0.0512 (1.9166)	0.0258 (2.6674)
Experience Squared	-0.0004 (-1.8761)	-0.0008 (-5.4668)	-0.0011 (-1.7903)	-0.0002 (-1.4711)
Spouse Present	0.5195 (3.7063)	0.1790 (1.7303)	-1.5848 (-2.0017)	0.0435 (0.1763)
Spouse Absent	0.4544 (1.5768)	0.3333 (1.6567)	-2.2309 (-2.1981)	0.2124 (0.6780)
Widowed	0.3947 (1.1225)	0.0734 (0.3104)	-1.2557 (-1.4502)	-0.1060 (-0.3785)
Divorced, Separated	0.4293 (2.2253)	0.0531 (0.3298)	-1.4588 (-1.8451)	0.1231 (0.4902)
Urban Residence	-0.0577 (0.4176)	0.8209 (9.8657)	1.0031 (1.8792)	-0.2157 (-2.1357)
Babyborn			-0.0992 (-1.5351)	-0.0090 (-0.4577)
F	4.1410	24.5439	2.2769	3.2647
R^2	0.0550	0.0511	0.0470	0.0085
Standard Error	0.8512	2.2187	1.4294	2.0550
Number of Observations	433	3,500	234	2,335

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[a] t-values in parentheses.

Table 43

Personal Characteristics Wage Equations for Whites and Non-Whites in 1970[a]

Dependent Variable: ln W	Whites 1970 (WC) Federal	 Private	Non-Whites 1970 (WC) Federal	 Private
Constant	-0.6164 (-5.3503)	-0.0399 (-1.0113)	-0.7308 (-3.0595)	-0.3146 (-2.0375)
Education	0.0393 (14.6728)	0.0156 (3.1262)	0.0717 (5.3818)	0.0136 (1.4047)
Experience	0.0572 (13.0393)	0.0165 (4.8145)	0.0304 (3.5912)	0.0153 (2.5238)
Experience Squared	-0.0009 (-9.7212)	-0.0007 (-10.2437)	-0.0004 (2.0245)	-0.0003 (-3.3438)
Sex	-0.3983 (-10.7487)	-0.2891 (-8.6503)	-0.2117 (-2.9479)	-0.3837 (-6.7112)
Spouse Present	0.1001 (2.0087)	0.1362 (2.8464)	0.3305 (3.5043)	0.4030 (5.2579)
Spouse Absent	-0.2811 (-2.1598)	0.0830 (0.6505)	-0.2157 (-0.9459)	-0.0371 (-0.2217)
Widowed	0.1016 (0.9358)	0.1507 (1.7128)	0.2392 (1.5080)	0.2965 (2.1823)
Divorced, Separated	-0.0070 (-0.0879)	0.2098 (2.7829)	0.0856 (0.6583)	0.1877 (1.8198)
Urban Residence	0.1695 (3.8039)	0.4993 (14.9776)	0.2474 (1.8703)	0.1931 (3.1118)
Disability	-0.3231 (-4.3998)	-0.1971 (-3.1150)	-0.2525 (-1.7531)	-0.4574 (-4.3680)
F	84.9744	74.0207	11.0629	14.6313
R^2	0.1757	0.0316	0.0653	0.0232
Standard Error	1.0227	2.3320	1.2776	2.0782
Number of Observations	3,942	22,407	1,441	5,733

[a] t-values in parentheses.

Table 44

Personal Characteristics Wage Equations for Males and Females in 1970[a]

	Males 1970 (WC)		Females 1970 (WC)	
Dependent Variable: ln W	Federal	Private	Federal	Private
Constant	-0.7884 (-7.7789)	0.0931 (0.9424)	-0.8130 (-3.2068)	-0.7593 (-5.8793)
Education	0.0883 (16.7758)	-0.0116 (-2.0034)	0.0752 (5.0537)	0.0591 (7.3859)
Experience	0.0522 (12.5560)	0.0093 (2.2494)	0.0515 (6.5574)	0.0207 (4.8022)
Experience Squared	-0.0008 (-9.2550)	-0.0006 (-8.0883)	-0.0009 (-4.7334)	-0.0004 (-5.2879)
Race	-0.2766 (-7.1093)	-0.1354 (-2.7572)	-0.1415 (-2.0897)	-0.1836 (-3.7079)
Spouse Present	0.4405 (8.6201)	0.4731 (8.4408)	0.0039 (0.0476)	-0.0670 (-1.1134)
Spouse Absent	0.0463 (0.3697)	0.2760 (1.8693)	-0.4997 (2.4298)	-0.1692 (-1.2153)
Widowed	0.4736 (3.4239)	0.3199 (2.1379)	0.0631 (0.4286)	-0.0773 (-0.8361)
Divorced, Separated	0.2734 (3.1191)	0.4423 (4.7281)	-0.1067 (-0.9687)	-0.0039 (-0.0485)
Urban Residence	0.0579 (1.3586)	0.5398 (13.9183)	0.4353 (4.5066)	0.2583 (5.7322)
Babyborn			-0.0660 (-3.0972)	-0.0420 (-3.5437)
Disability	-0.1013 (-1.6477)	-0.1816 (-2.6397)	-0.8252 (-5.0997)	-0.3935 (-4.3868)
F	98.5372	62.2935	14.7835	23.0423
R^2	0.2269	0.0341	0.0686	0.0220
Standard Error	0.8721	2.3954	1.3652	2.0816
Number of Observations	3,325	17,377	2,058	10,763

[a] t-values in parentheses.

Table 42

Personal Characteristics Wage Equations for White Males and Females in 1970[a]

Dependent Variable: ln W	White Males 1970 (WC) Federal	White Males 1970 (WC) Private	White Females 1970 (WC) Federal	White Females 1970 (WC) Private	43
Constant	-0.9503 (-9.2935)	0.0764 (0.6879)	-0.5257 (-1.7764)	-0.7731 (5.2361)	-0.2454 (-0.74)
Education	0.0964 (17.8928)	-0.0064 (-0.9788)	0.0325 (3.5600)	0.0610 (6.6005)	-0.0015 (-0.03)
Experience	0.0641 (14.4050)	0.0092 (1.9399)	0.0503 (6.5931)	0.0278 (5.5929)	-0.0325 (-3.13)
Experience Squared	-0.0011 (-11.0600)	-0.0006 (-7.5598)	-0.0010 (-5.0553)	-0.0006 (-6.5940)	0.0004 (1.33)
Spouse Present	0.3794 (6.9328)	0.4130 (6.2800)	-0.0141 (-0.1457)	-0.1244 (-1.7757)	-0.1103 (-9.19)
Spouse Absent	0.0996 (0.6748)	0.3746 (2.0341)	-0.5220 (-2.2738)	-0.1433 (-0.8553)	0.3796 (1.33)
Widowed	0.5297 (3.3705)	0.1693 (0.9254)	0.0414 (0.2385)	-0.0535 (-0.5828)	-0.1049 (-0.51)
Divorced, Separated	0.2315 (2.3411)	0.4274 (3.6851)	-0.0289 (-0.2114)	0.0510 (0.5308)	0.0799 (0.48)
Urban Residence	0.0510 (1.2359)	0.5886 (13.5058)	0.3585 (3.4395)	0.3161 (6.2706)	-0.0424 (-0.36)
Babyborn			-0.1395 (-4.8946)	-0.0638 (-4.0732)	0.0757 (2.33)
Disability	-0.1255 (-1.9625)	-0.1041 (-1.3312)	-0.9397 (-4.6547)	-0.4095 (-3.7744)	0.5302 (2.31)
F	88.4577	62.3699	12.6639	23.3678	
R^2	0.2353	0.0375	0.0778	0.0265	
Standard Error	0.7849	2.4604	1.3229	2.0748	
Number of Observations	2,559	14,178	1,383	8,229	

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[a] t-values in parentheses.

Table 46

Personal Characteristics Wage Equations for Non-White Males and Females in 1970[a]

Dependent Variable: ln W	Non-White Males 1970 (WC) Federal	Non-White Males 1970 (WC) Private	Non-White Females 1970 (WC) Federal	Non-White Females 1970 (WC) Private
Constant	-0.5936 (-1.9280)	-0.1066 (-0.5620)	-1.6133 (-3.3450)	-1.1072 (-4.3531)
Education	0.0590 (4.1777)	-0.0203 (-1.7273)	0.1025 (3.6707)	0.0675 (4.1316)
Experience	0.0245 (2.4439)	0.0193 (2.3251)	0.0374 (2.4297)	0.0129 (1.4251)
Experience Squared	-0.0003 (-1.6033)	-0.0006 (-4.1248)	-0.0005 (-1.3473)	-0.0001 (-0.5046)
Spouse Present	0.5909 (4.8777)	0.6579 (6.5195)	0.0910 (0.5984)	0.1036 (0.9016)
Spouse Absent	-0.0284 (-0.1144)	0.1504 (0.6672)	-0.4029 (-0.9191)	-0.1899 (-0.7599)
Widowed	0.4363 (1.5007)	0.6715 (2.8064)	0.1399 (0.5089)	-0.0955 (-0.5423)
Divorced, Separated	0.4079 (2.1722)	0.4970 (3.3796)	-0.1410 (-0.7409)	-0.0974 (-0.6622)
Urban Residence	0.0351 (0.2361)	0.2735 (3.2981)	0.6082 (2.5683)	0.0434 (0.4858)
Babyborn			0.0126 (0.3829)	-0.0127 (-0.6948)
Disability	-0.0146 (-0.0934)	-0.5006 (-3.6145)	-0.6663 (-2.4519)	-0.3645 (-2.2908)
F	8.6152	12.4560	4.2978	3.3519
R^2	0.0322	0.0312	0.0466	0.0092
Standard Error	1.1068	2.0596	1.4403	2.0858
Number of Observations	766	3,199	675	2,534

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[a] t-values in parentheses.

the earnings equations. In 1960 the sex differential ranges in size from 0.0151 (this is insignificant) to -0.5397 and the race differential ranges from -0.0867 to -0.3015. In 1970 the sex differential ranges from -0.2117 to -0.3983 and the race differential ranges from -0.1354 to -0.2766. This is intuitively reasonable since it indicates that non-whites and females are affected by discrimination in both pecuniary and non-pecuniary matters.

The coefficient of the BABYB variable is also smaller in the wage equations than the earnings equations in all cases where this variable is significant. It ranges in size in the Federal sector from 0.0126 (this is insignificant) to -0.1750 and in the private sector from -0.0090 (this is also insignificant) to -0.0730. The coefficient remains larger in the Federal sector for all groups in both years except for non-white females in 1970 (where the coefficient is insignificant for both Federal and private workers). This implies that the effect of lost experience due to child care is greater over a longer period of time than in terms of the base rate of pay.

Full-Scale Wage Equations

With the inclusion of the occupational variables in the full-scale wage equations, the pattern of the estimated coefficients changes. These changes are similar to those which occur when the occupational variables are included in the full-scale earnings equations except for the changes in the estimated sex and race differentials. It is expected

Table 47

Full-Scale Wage Equations for White and Non-Whites in 1960[a]

Dependent Variable: ln W	Whites in 1960 Federal	Whites in 1960 Private	Non-Whites in 1960 Federal	Non-Whites in 1960 Private
Constant	-0.4434 (-2.4090)	-1.0000 (-16.3719)	-0.0027 (-0.0034)	-1.6734 (-10.7837)
Education	0.0529 (5.2737)	0.0635 (9.7440)	0.0125 (0.7054)	0.0169 (1.7406)
Experience	0.0418 (7.2225)	0.0096 (2.4173)	0.0307 (2.5635)	0.0292 (4.5965)
Experience Squared	-0.0006 (-5.2187)	-0.0005 (-7.1420)	-0.0005 (-2.2036)	-0.0006 (-5.7636)
Sex	-0.4770 (-8.2481)	0.1878 (4.4488)	-0.3016 (-3.0559)	0.0632 (1.0467)
Spouse Present	-0.1213 (-1.8761)	0.0479 (0.9111)	0.1182 (0.8440)	0.0789 (1.0156)
Spouse Absent	-0.1223 (-0.6238)	-0.3082 (-2.2003)	-0.0920 (-0.3101)	0.2979 (2.0209)
Widowed	0.0462 (0.3370)	0.0422 (0.4122)	0.1093 (0.4167)	0.1270 (0.9142)
Divorced, Separated	0.1640 (1.5053)	0.0990 (1.0534)	0.1120 (0.5238)	0.0556 (0.5251)
Urban Residence	0.2243 (3.4427)	0.7295 (19.6718)	0.1291 (0.7838)	0.4247 (6.7174)
Professionals	0.3060 (4.7894)	0.1216 (1.9340)	0.2720 (1.5133)	0.5720 (3.9975)
Managers	0.2090 (2.3639)	-0.9264 (-13.8725)	0.4681 (1.0963)	-2.6918 (-10.1513)
Craftsmen	0.0977 (1.0861)	0.9921 (17.4083)	0.1692 (0.9501)	0.6601 (5.3166)
Operatives	-0.2933 (-1.7486)	0.9782 (18.1566)	-0.0206 (-0.1267)	0.9102 (11.1604)
Laborers	-0.0281 (-0.0773)	0.6472 (6.3252)	-0.2016 (-1.2506)	0.9608 (10.2264)

Table 47--Continued

	Whites in 1960		Non-Whites in 1960	
Dependent Variable: ln W	Federal	Private	Federal	Private
Service	0.0319 (0.2007)	-0.2495 (-3.0567)	-0.4722 (-3.3803)	0.3465 (4.2785)
F	24.6487	133.5426	3.4227	30.8131
R^2	0.1361	0.0882	0.0517	0.0705
Standard Error	1.0756	2.5088	1.0976	2.1154
Number of Observations	2,253	20,544	667	5,885

[a] t-values in parentheses.

Table 43

Full-Scale Wage Equations for Males and Females in 1960[a]

Dependent Variable: ln W	Males in 1960 Federal	Males in 1960 Private	Females in 1960 Federal	Females in 1960 Private
Constant	-0.5044 (-3.5459)	-1.8138 (-15.4072)	1.0519 (1.7988)	-0.5480 (-2.3931)
Education	0.0393 (5.1007)	0.0417 (6.0945)	0.0520 (2.3290)	0.0525 (5.9197)
Experience	0.0470 (8.9733)	0.0026 (0.5707)	0.0297 (2.7096)	0.0218 (4.5456)
Experience Squared	-0.0008 (-7.4655)	-0.0004 (-5.5098)	-0.0003 (-1.2825)	-0.0005 (-4.9638)
Race	-0.2293 (-4.2938)	-0.1370 (-2.5315)	0.0923 (0.7826)	-0.1555 (-2.8740)
Spouse Present	0.2111 (3.2413)	0.1923 (3.1602)	-1.9284 (-4.5002)	-0.5726 (-3.5491)
Spouse Absent	0.0125 (0.0775)	0.2074 (1.3921)	-1.8423 (-3.3646)	-0.8672 (-4.2657)
Widowed	0.2253 (1.1426)	0.2353 (1.5493)	-1.7052 (-3.7128)	-0.6914 (-3.9059)
Divorced, Separated	0.2129 (1.8037)	0.0994 (0.8802)	-1.6138 (-3.6397)	-0.4223 (-2.4492)
Urban Residence	0.1629 (2.9602)	0.8688 (20.9195)	0.2370 (1.6252)	0.1745 (3.5202)
Professionals	0.2958 (5.3377)	0.3336 (4.1290)	0.3999 (2.9925)	0.0780 (1.0305)
Managers	0.2798 (3.6886)	0.7405 (-9.9205)	-0.0610 (-0.2594)	-1.5982 (-11.9697)
Craftsmen	0.0768 (1.1864)	1.1306 (19.1609)	0.0955 (0.2134)	0.0757 (0.3634)
Operatives	-0.0127 (-0.1341)	1.2389 (20.4965)	-0.7299 (-1.9300)	0.3479 (5.2147)

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Table 48--Continued

Dependent Variable: ln W	Males in 1960 Federal	Males in 1960 Private	Females in 1960 Federal	Females in 1960 Private
Laborers	-0.0182 (-0.1625)	1.0335 (12.3445)	-1.6627 (-2.3376)	0.0240 (0.2202)
Service	-0.0821 (-0.9137)	0.5252 (5.5133)	-0.6712 (-2.6114)	-0.4337 (-7.0916)
Babyborn			-0.1365 (-3.8772)	-0.0455 (-3.4621)
F	25.3184	135.2084	6.8643	28.0414
R^2	0.1655	0.1045	0.0800	0.0451
Standard Error	0.8233	2.5656	1.3897	2.1247
Number of Observations	1,840	17,260	1,080	9,169

[a] t-values in parentheses.

Table 49

Full-Scale Wage Equations for White Males and Females in 1960[a]

Dependent Variable: ln W	White Males in 1960		White Females in 1960	
	Federal	Private	Federal	Private
Constant	-0.6301 (-3.2068)	-1.9340 (-14.0053)	1.6621 (2.3503)	-0.3756 (-1.2736)
Education	0.0483 (5.4373)	0.0535 (6.0336)	0.0512 (1.9903)	0.0695 (6.2367)
Experience	0.0524 (8.9394)	-0.0016 (-0.2396)	0.0275 (2.2909)	0.0261 (4.6732)
Experience Squared	-0.0009 (-7.6094)	-0.0004 (-4.1553)	-0.0002 (0.3578)	-0.0006 (-5.6202)
Spouse Present	0.1366 (1.8565)	0.2185 (2.9885)	-2.3954 (-4.6282)	-0.9498 (-4.4790)
Spouse Absent	-0.2082 (-1.0630)	0.0832 (0.4093)	-1.9293 (-2.9612)	-1.4929 (-5.6429)
Widowed	0.2911 (1.2062)	0.2693 (1.4112)	-2.1582 (-3.9307)	-1.0422 (-4.5427)
Divorced, Separated	0.1936 (1.2252)	0.1309 (0.8765)	-1.9378 (-3.5755)	-0.7375 (-3.2445)
Urban Residence	0.1978 (3.3153)	0.8955 (18.8131)	0.0960 (0.6302)	0.2634 (4.6407)
Professional	0.2545 (4.1888)	0.3101 (3.5105)	0.4210 (3.0029)	-0.1102 (-1.3169)
Manager	0.2370 (3.0128)	-0.7052 (-8.8079)	-0.1168 (-0.4358)	-1.4900 (-10.7179)
Craftsmen	0.0579 (0.8052)	1.1786 (17.8283)	0.5381 (0.7750)	0.1447 (0.6415)
Operatives	-0.1957 (-1.4874)	1.2957 (18.1292)	-3.4851 (-3.5263)	0.3769 (4.7833)
Laborer	-0.1114 (-0.4029)	0.8719 (7.7187)		
Service	0.0655 (0.5247)	0.2038 (1.4863)	-0.4199 (-0.4277)	-0.6309 (-6.9242)

Table 45--Continued

Dependent Variable: ln Y	White Males in 1960 Federal	White Males in 1960 Private	White Females in 1960 Federal	White Females in 1960 Private
Babyborn			-0.1737 (-4.0747)	-0.0699 (-4.0422)
F	13.8793	119.3296	7.0256	31.2336
R^2	0.1511	0.1075	0.0908	0.0538
Standard Error	0.8129	2.6554	1.3749	2.1414
Number of Observations	1,407	13,760	846	6,784

[a] t-values in parentheses.

Table 50

Full-Scale Wage Equations for Non-White Males and Females in 1960[a]

Dependent Variable: ln W	Non-White Males in 1960 Federal	Non-White Males in 1960 Private	Non-White Females in 1960 Federal	Non-White Females in 1960 Private
Constant	-0.2252 (-0.7437)	-1.3268 (-9.3309)	0.0286 (0.0242)	-1.2150 (-3.3336)
Education	0.0105 (0.6453)	0.0121 (0.9764)	0.0325 (0.7050)	0.0195 (1.2551)
Experience	0.0275 (2.3251)	0.0265 (3.1560)	0.0477 (1.7550)	0.0260 (2.7391)
Experience Squared	-0.0004 (-1.9966)	-0.0007 (-5.1729)	-0.0009 (-1.4572)	-0.0003 (-1.8057)
Spouse Present	0.5038 (3.5398)	0.0611 (0.6060)	-1.2351 (-1.5093)	0.0717 (0.2946)
Spouse Absent	0.4826 (1.6705)	0.3515 (1.8095)	-1.8519 (-1.7637)	0.2334 (0.7580)
Widowed	0.3392 (1.1075)	0.0336 (0.1472)	-0.9873 (-1.0926)	-0.0363 (-0.1320)
Divorced, Separated	0.4539 (2.3588)	-0.0173 (-0.1113)	-1.1829 (-1.4563)	0.1653 (0.6432)
Urban Residence	-0.0285 (-0.2046)	0.7109 (8.7439)	0.8435 (1.5515)	-0.1502 (-1.5005)
Professionals	0.2546 (1.5672)	-0.0550 (-0.2355)	0.3190 (0.6945)	0.9601 (5.3319)
Managers	0.6983 (1.7836)	-2.3185 (-7.5852)	0.0972 (0.0933)	-3.3694 (-6.1913)
Craftsmen	0.2049 (1.3589)	0.8532 (6.2582)	-0.0711 (-0.1163)	-0.1539 (-0.3209)
Operatives	0.0545 (0.3776)	1.1451 (10.7667)	-0.3151 (-0.7096)	0.5543 (4.2702)
Laborers	-0.0547 (-0.4098)	1.1445 (10.7691)	-1.4091 (-1.8242)	0.8534 (2.2931)

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Table 50--Continued

Dependent Variable: ln W	Non-White Males in 1960 Federal	Non-White Males in 1960 Private	Non-White Females in 1960 Federal	Non-White Females in 1960 Private
Service	-0.2482 (-1.7734)	0.8525 (7.0299)	-0.6024 (-1.3732)	-0.0247 (-0.2361)
Babyborn			-0.0751 (-1.1323)	-0.0061 (-0.3140)
F	3.2776	34.5341	1.7830	8.2478
R^2	0.0587	0.1183	0.0480	0.0436
Standard Error	0.8450	2.1387	1.4286	2.0183
Number of Observations	433	3,500	234	2,335

[a] t-values in parentheses.

Table 51

Full-Scale Wage Equations for Whites and Non-Whites in 1970[a]

Dependent Variable: ln W	Whites 1970 (WC) Federal	Whites 1970 (WC) Private	Non-Whites 1970 (WC) Federal	Non-Whites 1970 (WC) Private
Constant	-0.2973 (-2.2941)	-0.7730 (-7.3017)	-0.2974 (-1.1061)	-0.7975 (-4.8762)
Education	0.0639 (8.8978)	0.0467 (7.5900)	0.0427 (2.8159)	0.0217 (2.1779)
Experience	0.0545 (12.4374)	0.0137 (3.9883)	0.0310 (3.6468)	0.0152 (2.5228)
Experience Squared	-0.0009 (-9.4317)	-0.0006 (-8.6582)	-0.0004 (-2.1564)	-0.0003 (-2.9078)
Sex	-0.3569 (-8.5027)	-0.1025 (-2.7610)	-0.2211 (-2.8677)	-0.1895 (-2.9586)
Spouse Present	0.0857 (1.7277)	0.0963 (2.0153)	0.3142 (3.3453)	0.3748 (4.9197)
Spouse Absent	-0.2596 (-2.0059)	0.0555 (0.4379)	-0.1911 (-0.8414)	-0.0983 (-0.5933)
Widowed	0.0347 (0.7841)	0.1164 (1.2476)	0.2929 (1.5341)	0.2656 (1.9318)
Divorced, Separated	-0.0104 (-0.1308)	0.1959 (2.6138)	0.0663 (0.5119)	0.1438 (1.4073)
Urban Residence	0.1639 (3.7002)	0.5414 (16.2702)	0.2563 (1.9323)	0.2231 (3.6023)
Professionals	0.2470 (5.4248)	0.0490 (0.8970)	0.2640 (2.3330)	0.6296 (4.3036)
Managers	0.2777 (4.7286)	0.0183 (0.3084)	0.3359 (1.6264)	-1.2625 (-6.1780)
Craftsmen	0.0035 (0.0506)	0.6075 (11.6728)	-0.2232 (-1.6818)	0.4560 (4.2437)
Operatives	-0.0764 (-0.6943)	0.6290 (12.7256)	-0.0335 (-0.2376)	0.5608 (7.0831)

Table 51--Continued

Dependent Variable: ln W	Whites 1970 (WC) Federal	Whites 1970 (WC) Private	Non-Whites 1970 (WC) Federal	Non-Whites 1970 (WC) Private
Laborers	-0.3970 (-2.3195)	0.2517 (3.1400)	-0.1174 (-0.7412)	0.5106 (5.7106)
Service	-0.1215 (-1.7742)	-0.2866 (-4.4368)	-0.3315 (-3.0552)	0.0427 (0.5210)
Disability	-0.3151 (-4.3125)	-0.1670 (-2.6550)	-0.2327 (-1.6221)	-0.4127 (-3.9858)
F	57.3377	67.1930	8.3662	13.5394
R^2	0.1861	0.0451	0.0757	0.0457
Standard Error	1.0162	2.3156	1.2705	2.0532
Number of Observations	3,942	22,407	1,441	5,733

[a] t-values in parentheses.

Table 52

Full-Scale Wage Equations for Males and Females in 1970^a

Dependent Variable: ln W	Males 1970 (WC) Federal	Males 1970 (WC) Private	Females 1970 (WC) Federal	Females 1970 (WC) Private
Constant	-0.4974 (-4.3947)	-0.8453 (-7.2521)	-0.3540 (-1.3052)	-0.7849 (-5.6485)
Education	0.0663 (10.8023)	0.0239 (3.5331)	0.0397 (2.3822)	0.0607 (7.0431)
Experience	0.0503 (12.1231)	0.0069 (1.6627)	0.0486 (6.1665)	0.0218 (5.0524)
Experience Squared	-0.0008 (-9.0301)	-0.0005 (-6.4552)	-0.0008 (-4.5716)	-0.0004 (-5.3633)
Race	-0.2079 (-5.1326)	-0.1772 (-3.5280)	-0.0825 (-1.1853)	-0.1530 (-3.1821)
Spouse Present	0.4200 (8.2342)	0.4291 (7.6587)	0.0045 (0.0549)	-0.0961 (-1.6035)
Spouse Absent	0.0512 (0.4114)	0.2122 (1.4485)	-0.4503 (-2.1947)	-0.1900 (-1.3713)
Widowed	0.4641 (3.3769)	0.2756 (1.8575)	0.0530 (0.3612)	0.0939 (-1.0756)
Divorced, Separated	0.2492 (2.8593)	0.3923 (4.2234)	-0.0372 (-0.7950)	-0.0040 (-0.0500)
Urban Residence	0.0518 (1.2239)	0.5569 (14.4298)	0.4415 (4.5801)	0.2932 (6.4583)
Professionals	0.1914 (4.2576)	0.2601 (3.7139)	0.3386 (3.9125)	0.1079 (1.4866)
Managers	0.2391 (4.3045)	0.2274 (3.2751)	0.2984 (2.0276)	-0.6118 (-5.4712)
Craftsmen	-0.1044 (-1.9444)	0.7553 (13.2222)	0.3392 (0.9525)	0.1709 (1.1674)
Operatives	-0.0231 (-0.3094)	0.8782 (14.5544)	-0.1210 (-0.4596)	0.2536 (4.3604)

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Table 52--Continued

Dependent Variable: ln W	Males 1970 (WC) Federal	Males 1970 (WC) Private	Females 1970 (WC) Federal	Females 1970 (WC) Private
Laborers	-0.1764	0.7149	-0.0940	-0.2156
	(-1.9548)	(8.7442)	(-0.1820)	(-1.1757)
Service	-0.1635	0.2162	-0.3619	-0.3914
	(-2.2346)	(2.4740)	(-2.6023)	(-6.6499)
Babyboom			-0.0609	-0.0400
			(-2.8580)	(-3.3918)
Disability	-0.0911	-0.1433	-0.7963	-0.3933
	(-1.4916)	(-2.0973)	(-4.9362)	(-4.4616)
F	65.9430	58.4204	11.1693	22.3426
R^2	0.2332	0.0502	0.0775	0.0326
Standard Error	0.8658	2.3753	1.3587	2.0703
Number of Observations	3,325	17,377	2,058	10,763

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[a] t-values in parentheses.

Table 53

Full-Scale Wage Equations for White Males and Females in 1970[a]

Dependent Variable: ln W	White Males 1970 (WC) Federal	White Males 1970 (WC) Private	White Females 1970 (WC) Federal	White Females 1970 (WC) Private
Constant	-0.6665 (-5.7014)	-0.9327 (-6.8796)	-0.0949 (-0.2970)	-0.8352 (5.1006)
Education	0.0749 (11.7998)	0.0352 (4.5406)	0.0304 (1.5427)	0.0675 (6.5970)
Experience	0.0618 (13.8784)	0.0055 (1.1737)	0.0559 (6.0895)	0.0277 (5.5874)
Experience Square	-0.0010 (-10.7597)	-0.0005 (-5.8555)	-0.0010 (-4.8356)	-0.0006 (-6.4791)
Spouse Present	0.3539 (6.4498)	0.3626 (5.5117)	-0.0115 (-0.1186)	-0.1654 (-2.3712)
Spouse Absent	0.1183 (0.8042)	0.3193 (1.7479)	-0.4788 (-2.0895)	-0.1545 (-0.9274)
Widowed	0.5234 (3.3442)	0.1346 (0.7418)	0.0388 (0.2245)	-0.0901 (-0.8314)
Divorced, Separated	0.2068 (2.1005)	0.3902 (3.3902)	-0.0053 (-0.0391)	0.0556 (0.5820)
Urban Residence	0.0441 (1.0768)	0.6099 (14.0748)	0.3570 (3.4299)	0.3509 (6.9012)
Professionals	0.1847 (3.9994)	0.1994 (2.6389)	0.3299 (3.4136)	-0.0134 (-0.1722)
Managers	0.2175 (3.9746)	0.2692 (3.6348)	0.3336 (2.1155)	-0.5193 (-4.4381)
Craftsmen	-0.0393 (-0.6807)	0.7930 (12.5212)	0.3379 (0.5661)	0.1420 (0.8820)
Operatives	-0.1097 (-1.1963)	0.9196 (13.2159)	0.1640 (0.3697)	0.2373 (4.1819)
Laborers	-0.3865 (-2.8135)	0.5396 (5.1583)		
Service	-0.0490 (-0.5379)	0.0893 (0.7367)	-0.6120 (-2.1867)	-0.4863 (-6.7177)

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Table 53--Continued

Dependent Variable: ln W	White Males 1970 (WC) Federal	White Males 1970 (WC) Private	White Females 1970 (WC) Federal	White Females 1970 (WC) Private
Babyborn			-0.1315 (-4.6209)	-0.0594 (-3.8066)
Disability	-0.1234 (-1.9401)	-0.0664 (-0.8562)	-0.9079 (-4.5064)	-0.4007 (-3.7128)
F	56.8727	55.2400	9.8696	22.6124
R^2	0.2468	0.0543	0.0878	0.0379
Standard Error	0.7790	2.4389	1.3157	2.0626
Number of Observations	2,559	14,178	1,383	8,229

[a] t-values in parentheses.

Table 54

Full-Scale Wage Equations for Non-White Males and Females in 1970[a]

Dependent Variable: ln W	Non-White Males 1970 (WC) Federal	Non-White Males 1970 (WC) Private	Non-White Females 1970 (WC) Federal	Non-White Females 1970 (WC) Private
Constant	-0.1039 (-0.3483)	-0.8963 (-4.2802)	-1.0807 (-2.0891)	-1.1159 (-4.3071)
Education	0.0348 (2.1547)	-0.0012 (-0.0983)	0.0636 (2.0144)	0.0595 (3.5815)
Experience	0.0239 (2.3797)	0.0168 (2.0465)	0.0372 (2.3918)	0.0154 (1.7037)
Experience Squared	-0.0003 (-1.6130)	-0.0005 (-3.4834)	-0.0005 (-1.3148)	-0.0001 (-0.6727)
Spouse Present	0.5597 (4.6300)	0.6157 (6.1430)	0.0903 (0.5949)	0.0890 (0.7444)
Spouse Absent	-0.0324 (-0.1314)	0.0534 (0.2403)	-0.3313 (-0.7546)	-0.2106 (-0.8497)
Widowed	0.3861 (1.3345)	0.5853 (2.4817)	0.1299 (0.4702)	-0.1006 (-0.5756)
Divorced, Separated	0.3235 (1.7527)	0.4195 (2.8881)	-0.1333 (-0.7018)	-0.1159 (-0.7940)
Urban Residence	0.0453 (0.3070)	0.2606 (3.1536)	0.6315 (2.6451)	0.0705 (0.7057)
Professionals	0.2115 (1.5773)	0.5545 (2.5963)	0.3531 (1.8565)	0.8689 (4.2592)
Managers	0.4243 (1.8133)	-0.9093 (-3.6330)	0.1340 (0.3640)	-1.5915 (-4.2639)
Craftsmen	-0.2708 (-2.1360)	0.6737 (5.0905)	0.2863 (0.6129)	0.4150 (1.1979)
Operatives	0.0254 (0.1869)	0.8597 (7.1318)	-0.3069 (-0.8896)	0.3548 (3.2207)
Laborers	-0.1557 (-1.0474)	0.9032 (6.8213)		

Table 54--Continued

Dependent Variable: ln W	Non-White Males 1970 (WC) Federal	Non-White Males 1970 (WC) Private	Non-White Females 1970 (WC) Federal	Non-White Females 1970 (WC) Private
Service	-0.2824 (-2.1304)	0.4339 (3.1216)	-0.3176 (-1.7857)	-0.1136 (-1.1119)
Babyborn			0.0154 (0.4635)	-0.0153 (-0.8444)
Disability	0.0126 (0.0810)	-0.4260 (-3.1136)	-0.6517 (-2.4319)	-0.3928 (-2.4922)
F	6.4298	15.0134	3.4152	5.9385
R^2	0.0962	0.0617	0.0510	0.0287
Standard Error	1.0984	2.0270	1.4370	2.0662
Number of Observations	766	3,199	675	2,534

[a] t-values in parentheses.

that these differentials will decrease because much of sex and race discrimination occurs through occupational discrimination. However, in the full-scale wage equations, certain of these differentials increase in absolute value: one of these is the racial differential for private sector males in 1960 which increases from -0.0267 in the personal characteristics equation to -0.1370 in the full-scale equation. The change in the sex differential for private sector whites is further from expectation: it changes from an insignificant 0.0151 to a highly significant 0.1878.

The same criticism applies to use of these occupational variables in the wage rate equations as in the earnings equations. The changes in the patterns of the estimated coefficients in the full-scale equations emphasize the shortcomings of the occupational variables and that the personal characteristics equations are the most meaningful for the purposes of this study.

Personal Characteristics Equations for White Females

The significance of the differences between the estimated coefficients for Federal and private sector white females is examined in relation to the estimated wage rate differential. Unlike the earnings and wage rate differentials of every other race-sex group, the wage rate differential for white females increased slightly between 1960 and 1970 from 0.834 to 0.842. When these differentials are decomposed using the Federal regression weights, the proportion considered an economic rent increases from 67 per cent to 75 per cent of the gross differential. When the 1960 gross differential is decomposed using the private regression weights, a peculiar result occurs. These weights indicate that if white females in the Federal sector were paid according to the wage rate structure estimated for those in the private sector, the Federal workers would receive higher wage rates than they do at present. This implies that there is discrimination (in the usual meaning of the term) in wage rates against white females in the Federal sector but that this is offset by their superior productive characteristics. This result is extreme and reflects the fact that the negative effects of the marital status variables (all variables except the spouse absent variable) and the SABYB variable are significantly smaller in the private sector. These same variables have significantly smaller effects in the private sector in the earnings equations but the difference between the estimated coefficients of the spouse absent variable is much larger in the wage rate equation. Since the true estimate of the components of the gross differential probably falls between the estimates made with the Federal and private regression weights, it is reasonable to assume that the portion of the differential which remains between comparable workers is smaller than that estimated with Federal regression weights but is not negative.

An examination of the mean number of weeks worked by white females in both years confirms that they enjoy greater stability of employment within the year in the Federal sector. In 1960 the mean values are 47.501 weeks in the Federal sector and 42.043 weeks in the private sector. In 1970 the values are 46.883 weeks in the Federal sector and 46.557 weeks in the private sector. The fact that a differential in wage rates exists between Federal and private sector white females and that some portion of it remains between comparable workers suggests that the observed earnings differential cannot be attributed primarily to differences in non-pecuniary benefits. This indicates that the Comparability Doctrine has not been successful in establishing equal basic rates of pay or equal earnings for workers of comparable productivity. The changes in the number of weeks worked in the two sectors between 1960 and 1970 also provide an explanation for the increase in the wage rate differential when the earnings differential for white females decreased over this period. Although weeks worked are larger in the Federal sector in both years, the difference from weeks worked in the private sector is much smaller in 1970. Furthermore, weeks worked in the Federal sector decreased between 1960 and 1970. This indicates that the slight increase in basic rate of pay during this period was offset by the decrease in both the absolute and relative number of weeks worked in the Federal sector so that the earnings differential decreased while the wage rate differential increased.

Summary and Conclusions

Federal workers as a whole and in every race-sex group in 1960 and in 1970 benefit from Federal employment both in pecuniary and non-pecuniary terms. Each of these wage rate differentials is smaller than the corresponding earnings differentials, since the wage rate differentials primarily reflect both types of benefits. Each of the wage differentials (except that for white females) decreased between 1960 and 1970. The decreases ranged in size from 4 per cent for non-white females to 27 per cent for non-white males. Differences in general economic conditions probably account for these decreases. Like the earnings differentials, the largest wage rate differential in both years is for white males (1.507 in logs in 1960 and 1.205 in logs in 1970) while the smallest in 1960 is for white females (0.834 in logs) and in 1970 is for non-white males (0.780 in logs). More than half of all the differentials (except that for white females in 1960) remains between comparable workers and this is considered an economic rent paid to Federal workers. These results indicate that the Comparability Doctrine has been unsuccessful in establishing either equal earnings or equal pay rates for workers of comparable productivity. Federal workers apparently have no need of a comparability policy to improve their position in either pecuniary or non-pecuniary matters. The policy has, instead, helped them to maintain their superior position.

Footnotes

[1] Victor R. Fuchs has noted that while this procedure using the number of hours in a single week of a different year to estimate the hourly wage rate might result in large errors for a single individual, such errors are probably absent from large groups: for further comments on this point, see his Differentials in Hourly Earnings by Region and City Size, 1959, Occasional Paper 101 (New York: National Bureau of Economic Research, Dist. by Columbia University Press, 1967), p. 4.

[2] The Chow test for these equations indicates that the wage structures in Federal and private sectors are significantly different.

[3] Because these means are computed from the natural logarithms of wage rates, they are geometric means:

$$W = \exp \sum_{i=1}^{n} (\ln W_i)/n.$$

[4] The estimated sex differential for private sector workers is unexpected (the positive value of 0.1468 is significant at the 5 per cent level). This type of result emphasizes the shortcomings of the occupational variables which change the pattern of the coefficients of the personal characteristics variables in an often unpredictable way.

[5] The estimated components of the differential for white females in 1960 on the basis of the private regression weights in the personal characteristics equations depart from this pattern and will be considered in detail below.

CHAPTER VII

CONCLUSIONS AND POLICY IMPLICATIONS

The analyses of earnings and wage rate differentials between Federal government and private sector workers for 1960 and 1970 have indicated certain clear patterns in the determinants of earnings and wage rates in the two sectors and in the components of the estimated differentials. From these analyses conclusions were drawn with respect to the comparability of Federal and private workers in the two years and the application of the Comparability Doctrine during that period. Policy implications for the Federal pay systems may be drawn from these results.

Before examining these policy implications, a brief review of the findings of this thesis is valuable. In addition, consideration is given to the source of the observed economic rent paid to Federal workers in both wage rates and earnings. This, too, has implications for Federal pay policy.

Review of the Results

During the 1960's, detailed reforms were made in the Federal pay systems in order to achieve the goal of equal pay for comparable workers in the Federal government and the private sector. The policymakers maintained that these reforms were needed in the early 1960's to bring the underpaid Federal workers to comparability with their counterparts in the private sector. Full comparability was to have been achieved between the two sectors by 1970. However, this is an expensive policy with important implications for this country's manpower needs and uses which requires re-evaluation both with respect to its original rationale and its subsequent application. This thesis has attempted to provide that re-evaluation on the basis of data which are independent of those employed in setting the comparability pay rates.

An advantage allegedly associated with employment by the Federal government is the existence of greater non-pecuniary benefits there than in the private sector. These benefits include differences in the stability of employment, hours worked, and intensity of work effort. Therefore, in order to examine the comparability of Federal and private sector workers, some consideration must be given to differences in these non-pecuniary benefits. For this purpose, both earnings and wage rates in the two sectors are compared. Earnings are thought to reflect certain of these non-pecuniary benefits (stability of employment within the year measured in differences in weeks worked) while wage rates do not. Consequently, a comparison of wage rates in the two sectors enables a determination of the comparability of pay of Federal and private sector workers without accounting for this particular non-pecuniary difference while a comparison of earnings in the two sectors permits a similar determination with such an allowance. Using Oaxaca's technique for decomposing differentials, each of these comparisons is made by determining what part of the observed differential is due to differences in productive characteristics between the two types of workers and the residual is ascribed to economic rent.

Examination of the earnings and wage rate data reveals that Federal earnings and wage rates exceed private earnings and wage rates in both years in terms of differences between all workers in each sector, all non-professional workers in each sector, and each of the eight race-sex groups in each sector. This does not indicate that the earnings of every Federal worker are greater than those of his or her counterpart in the private sector. These results pertain to the averages of the natural logarithms of earnings and wage rates of similar groups in the two sectors. In most cases these gross differentials are larger in 1960 than in 1970. The relative size of the net differentials (that portion of the differential which remains between comparable workers) varies according to sex. For both whites and non-whites, the proportion of both the earnings and wage rate differentials which is attributable to economic rent paid to Federal workers is larger in 1970 than in 1960 for females but is larger in 1960 than in 1970 for males.[1] This probably reflects differences in general economic conditions in the two years and differences in the impact of inflation on males and females in the two sectors during the latter part of the 1960's.

In both years the largest gross and net earnings and wage rate differentials (in absolute size) appear for white males. In 1960, the smallest gross and net earnings and wage rate differentials are for white females while in 1970 the smallest gross and net earnings differentials are for non-white males. The smallest gross wage rate differential in 1970 is also for non-white males but the smallest net differential occurs for females. When the gross differentials are decomposed into a part attributable to differences in productive characteristics between the two types of workers and the residual considered an economic rent, the largest proportion of most of these differentials consists of this economic rent: in most cases the economic rent is more than 70 per cent of the total differential. That this is the case for both earnings and wage rate differentials indicates that higher earnings in the Federal sector are not solely due to greater stability of employment in the Federal government.

Perusal of the earnings and wage rate equations estimated for both years reveals certain patterns which contribute to the observed economic rent in earnings and wage rates paid to Federal workers. In the personal characteristics equations, the estimated rates of return to education and experience[2] are higher for Federal than for private sector workers in nearly every race-sex group.[3] These personal characteristics equations are the preferred equations for examining the comparability of Federal and private workers both because of the basic policy goal of the Comparability Doctrine and because the meaning of the occupational variables is questionable.

Dummy variables for race and sex are included when possible to compare the effects of these types of discrimination in the Federal government and the private sector. Assuming that the other personal characteristics variables control for differences in productivity between the races and sexes, these results indicate that non-white females lose less in terms of earnings in 1960 and wage rates in both years from discrimination in the Federal government than in the private sector. Non-white males and white females lose less from discrimination in the private sector. In 1970, however, discrimination in terms of earnings appears greater in the private sector except for racial discrimination against males which is stronger in the Federal government.

Source of the Economic Rent

The estimated differentials indicate that all Federal workers, no matter what their race or sex, receive an economic rent both in wage rates and in earnings; but they do not explain the source of this economic rent. The explanation for this can be found in the institutional setup of Federal employment. It was noted in Chapter III that the proponents of the Comparability Doctrine have treated government as a restrictive force which sets up non-competing groups to the disadvantage of Federal workers. It is true that if government is not a restrictive force, there would be no need for intervention in the Federal wage-setting process to assure equal pay for comparable workers in the two sectors, for market forces would achieve this result through the private wage-setting process and quality adjustments. If there was free movement between the two sectors and Federal wages were less than those for comparable private workers, Federal workers would leave government employment for the private sector. Private employment would rise and wages would fall until wages were equal in the two sectors or the quality of Federal workers fell. Alternatively, if Federal wages were higher than private sector, private workers would enter Federal government employment. Private employment would fall and wages rise until wages in the two sectors were equal or quality adjusted accordingly. However, the findings of this thesis have indicated that government is a restrictive force which sets up non-competing groups that lead to a persistent pay differential in favor of Federal workers.

The Federal government acts as a restrictive force which results in non-competing groups through its system of career employees. Over 91 per cent of all Federal employee positions are in the career service, which consists of those positions regulated by the United States Civil Service Commission or merit systems administered by other Federal agencies. Career employees are selected through "open competition."[4] However, once an individual attains career status, which occurs after completing certain periods of service, he enjoys many advantages over those who have not attained this status. These include: he can move within and between agencies without competitive examination to a job for which he qualifies; he is retained during a reduction of the Federal work force in preference to comparable Federal workers who have not attained career status; by law, he is protected from arbitrary removal; and he may re-enter Federal employment without competitive examination.[5] It is through this policy that Federal career employees, who constitute the majority of all Federal employees, form a non-competing group: a private worker who wishes to enter Federal government employment and enjoy the higher pay there cannot compete with a Federal career employee of comparable productive characteristics because the career employee is given preference over him in all job selections and layoffs. This private worker can compete with the career employee on an equal basis only when he has been in Federal employment for a sufficient time to achieve career status also. This implies that there will always be an excess supply of applicants for Federal employment. The Federal career service policy, then, is the basic cause of the Federal-private differential which may be expected to persist as long as this employment policy is maintained.

Policy Recommendations

The results of this thesis indicate that in 1960 Federal workers were in a superior position to comparable private workers and in 1970 they still enjoyed that advantage.[6] This implies that the Comparability Doctrine, which was designed to provide guidance for setting Federal wage levels, was conceived in error and implemented in error. The policy of comparisons of wage rates is derived from collective bargaining and is one which frequently is used in wage determination. However, if one searches, it is always possible to make a comparison which is favorable to a wage increase. It was noted in Chapter II that the General Accounting Office, in its study of the comparability process, found the comparisons of jobs at GS-5, GS-7, GS-9, and GS-15 to be of this type. At each of these levels, the "PATC" survey covered a larger proportion of the higher paying jobs in the private sector than are found at this level in the Federal government.[7] Such comparisons can inflate the entire Federal wage scale.

It is recognized that the Federal pay system is enormously complex. It covers diverse jobs located throughout the United States and abroad. Consequently, some structure is necessary to coordinate these pay relationships. This structure must define internally cohesive relationships with allowance for equity considerations among Federal employees. However, the precise ways in which the structure should account for these points are beyond the scope of this thesis and will not be considered.

Many external forces also impinge on this structure. These include fiscal policy, collective bargaining practices, and changes in the cost of living, as well as comparisons with private sector pay rates. The Comparability Doctrine, which accounts for this last external force cited, has been estimated to cost $420 million a year for a one per cent increase in pay.[8] With expenses such as these to implement this one policy, the additional expense necessary to obtain an accurate estimate of the number of applicants at each Federal job level appears justified in considering Federal pay raises both as a check on the implications of the comparisons with private sector jobs and to account for the influence of other market forces on the Federal pay structure.

Without reforms in pay policy such as these, the Federal-private differentials in earnings, wage rates, and total compensation may be expected to persist in the future.

Footnotes

[1] This pattern is consistent for a single estimate of the economic rent for each race-sex group formed by averaging the two estimates made on the basis of the Federal and the private regression weights. The pattern also holds for most of these individual estimates.

[2] This conclusion is under the assumption that both Federal and private sector workers initially devote the same proportion of time to on-the-job training. If the rate of return to experience is assumed equal in both sectors, the estimated experience coefficients imply a greater proportion of time devoted to on-the-job training in the Federal sector.

[3] The exceptions to this generalization are: non-white females in 1960 and white females in 1970 whose estimated rates of return to education are higher in the private sector in the personal characteristics earnings regressions; and non-white males in 1960 whose estimated rate of return to education is higher in the private sector in the personal characteristics wage rate regression.

[4] CSC, *Federal Career Service*.

[5] *Ibid*.

[6] This applies to Federal workers on average but it does not mean that every individual occupation in the Federal government has an advantage in pay over the comparable private sector occupation.

[7] Comptroller General, *Survey of Non-Federal Salaries*, pp. 15-22.

[8] *Ibid*., p. 1.

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Appendix A

Means of the Variables

Means	1970 (INDUS)		Non-Professionals	
	Federal	Private	Federal	Private
Constant	1.000	1.000	1.000	1.000
Education	15.126	13.060	13.980	12.271
Experience	20.168	21.447	20.588	22.496
Experience Squared	577.021	695.282	614.786	743.475
Race	0.232	0.220	0.336	0.220
Sex	0.382	0.408	0.447	0.390
Spouse Present	0.704	0.680	0.657	0.678
Spouse Absent	0.016	0.020	0.022	0.020
Widowed	0.028	0.046	0.036	0.047
Divorced, Separated	0.075	0.078	0.090	0.083
Urban Residence	0.862	0.676	0.855	0.655
Professionals	0.310	0.162	0.000	0.000
Managers	0.117	0.079	0.144	0.095
Sales	0.002	0.068	0.005	0.089
Craftsmen	0.065	0.146	0.122	0.178
Operatives	0.023	0.172	0.054	0.215
Laborers	0.017	0.048	0.033	0.057
Service	0.037	0.106	0.082	0.110
Disability	0.053	0.066	0.058	0.071
ln E	8.902	7.759	8.628	7.646
Earnings	$7,346.65	$2,342.56	$5,585.89	$2,092.26
ln W	1.366	0.407	1.132	0.281

Appendix A--Continued

Means	1970 (INDUS) Federal	1970 (INDUS) Private	Non-Professionals Federal	Non-Professionals Private
Wage Rate	$3.92	$1.50	$3.10	$1.32
Hours Worked	40.757	40.170	40.519	40.458
Weeks Worked	48.719	45.146	47.912	45.357

Appendix A--Continued

Means	1960 Federal	1960 Private	1970 (WC) Federal	1970 (WC) Private
Constant	1.000	1.000	1.000	1.000
Education	14.529	11.897	14.881	12.762
Experience	21.304	23.548	20.247	21.873
Experience Squared	613.589	779.432	588.716	716.379
Race	0.228	0.223	0.268	0.204
Sex	0.370	0.347	0.382	0.382
Spouse Present	0.701	0.696	0.689	0.684
Spouse Absent	0.017	0.024	0.020	0.020
Widowed	0.036	0.047	0.033	0.046
Divorced, Separated	0.075	0.065	0.077	0.079
Urban Residence	0.864	0.643	0.858	0.667
Professionals	0.241	0.111	0.304	0.115
Managers	0.072	0.078	0.100	0.084
Sales	0.000	0.070	0.004	0.079
Craftsmen	0.092	0.142	0.085	0.157
Operatives	0.039	0.181	0.038	0.191
Laborers	0.028	0.059	0.023	0.051
Service	0.050	0.081	0.057	0.098
Disability			0.054	0.068
ln E	8.372	6.993	8.816	7.674
Earnings	$4,324.27	$1,088.98	$6,741.25	$2,151.67
ln W	0.826	-0.378	1.302	0.304
Wage Rate	$2.28	$ .69	$3.68	$1.36

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Appendix A--Continued

Means	1960 Federal	1960 Private	1970 (WC) Federal	1970 (WC) Private
Hours Worked	41.389	42.024	40.601	40.566
Weeks Worked	48.592	44.463	48.290	45.455

Appendix A--Continued

Means	Whites in 1960 Federal	Whites in 1960 Private	Non-Whites in 1960 Federal	Non-Whites in 1960 Private
Constant	1.000	1.000	1.000	1.000
Education	14.998	12.402	12.943	10.133
Experience	21.473	23.242	20.735	24.618
Experience Squared	624.442	762.559	576.930	838.334
Sex	0.375	0.330	0.351	0.405
Spouse Present	0.707	0.732	0.679	0.572
Spouse Absent	0.015	0.018	0.025	0.044
Widowed	0.035	0.043	0.040	0.063
Divorced, Separated	0.060	0.048	0.126	0.123
Urban Residence	0.848	0.623	0.921	0.714
Professionals	0.292	0.128	0.067	0.050
Managers	0.090	0.097	0.010	0.011
Craftsmen	0.098	0.165	0.072	0.064
Operatives	0.020	0.179	0.100	0.188
Laborers	0.004	0.035	0.108	0.143
Service	0.023	0.055	0.142	0.175
ln E	8.468	7.074	8.050	6.709
Earnings	$4,759.98	$1,180.86	$3,133.79	$819.75
ln W	0.908	-0.351	0.548	-0.471
Wage Rate	$2.48	$ .70	$1.73	$ .62
Hours Worked	41.661	43.033	40.468	38.500
Weeks Worked	48.790	45.133	47.924	42.123

Appendix A--Continued

Means	Males in 1960 Federal	Males in 1960 Private	Females in 1960 Federal	Females in 1960 Private
Constant	1.000	1.000	1.000	1.000
Education	14.647	11.595	14.327	12.464
Experience	21.625	24.199	20.757	22.323
Experience Squared	617.607	812.187	606.744	717.772
Race	0.235	0.203	0.217	0.260
Spouse Present	0.826	0.769	0.488	0.559
Spouse Absent	0.017	0.020	0.018	0.030
Widowed	0.011	0.020	0.080	0.099
Divorced, Separated	0.037	0.040	0.139	0.111
Urban Residence	0.846	0.613	0.895	0.700
Professionals	0.301	0.096	0.139	0.139
Managers	0.093	0.103	0.035	0.030
Craftsmen	0.140	0.212	0.009	0.012
Operatives	0.053	0.197	0.014	0.152
Laborers	0.042	0.087	0.004	0.006
Service	0.058	0.053	0.037	0.135
Babyborn			4.565	4.116
ln E	8.604	7.106	7.976	6.780
Earnings	$5,453.43	$1,219.26	$2,910.27	$880.07
ln W	1.010	-0.394	0.513	-0.347
Wage Rate	$2.75	$ .67	$1.67	$ .71
Hours Worked	42.221	44.648	39.970	37.084
Weeks Worked	49.406	45.986	47.206	41.596

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Appendix A--Continued

Means	White Males in 1960 Federal	White Males in 1960 Private	White Females in 1960 Federal	White Females in 1960 Private
Constant	1.000	1.000	1.000	1.000
Education	15.317	12.115	14.468	12.983
Experience	21.623	23.897	21.222	21.914
Experience Squared	619.548	793.248	632.582	700.311
Spouse Present	0.846	0.803	0.476	0.537
Spouse Absent	0.014	0.014	0.015	0.025
Widowed	0.009	0.017	0.078	0.096
Divorced, Separated	0.022	0.029	0.123	0.086
Urban Residence	0.831	0.595	0.876	0.678
Professionals	0.370	0.112	0.164	0.159
Managers	0.119	0.126	0.043	0.038
Craftsmen	0.154	0.240	0.005	0.014
Operatives	0.031	0.189	0.002	0.161
Laborers	0.006	0.051	0.000	0.003
Service	0.035	0.031	0.002	0.102
Babyborn			4.882	4.080
ln E	8.726	7.159	8.037	6.901
Earnings	$6,161.04	$1,285.62	$3,093.32	$993.27
ln W	1.118	-0.389	0.560	-0.274
Wage Rate	$3.06	$ .68	$1.75	$ .76
Hours Worked	42.648	45.591	40.020	37.844
Weeks Worked	49.565	46.657	47.501	42.043

Appendix A--Continued

Means	Non-White Males in 1960 Federal	Non-White Males in 1960 Private	Non-White Females in 1960 Federal	Non-White Females in 1960 Private
Constant	1.000	1.000	1.000	1.000
Education	12.471	9.552	13.816	10.986
Experience	21.630	25.389	19.077	23.486
Experience Squared	611.298	886.444	513.333	767.439
Spouse Present	0.760	0.637	0.530	0.477
Spouse Absent	0.025	0.044	0.026	0.045
Widowed	0.016	0.033	0.085	0.107
Divorced, Separated	0.088	0.083	0.197	0.182
Urban Residence	0.896	0.682	0.966	0.761
Professionals	0.079	0.030	0.047	0.080
Managers	0.012	0.015	0.009	0.006
Craftsmen	0.097	0.103	0.026	0.007
Operatives	0.125	0.230	0.056	0.127
Laborers	0.157	0.232	0.017	0.013
Service	0.132	0.139	0.162	0.229
Babyborn			3.419	4.218
ln E	8.209	6.895	7.755	6.436
Earnings	$3,673.87	$987.33	$2,333.21	$623.91
ln W	0.659	-0.414	0.342	-0.553
Wage Rate	$1.93	$ .66	$1.41	$ .58
Hours Worked	40.832	40.939	39.793	34.922
Weeks Worked	48.888	43.349	46.139	40.323

Appendix A--Continued

Means	Whites in 1970 (WC) Federal	Whites in 1970 (WC) Private	Non-Whites in 1970 (WC) Federal	Non-Whites in 1970 (WC) Private
Constant	1.000	1.000	1.000	1.000
Education	15.344	13.149	13.616	11.251
Experience	20.795	21.591	18.745	22.973
Experience Squared	607.614	698.702	537.020	785.471
Sex	0.351	0.367	0.468	0.442
Spouse Present	0.725	0.717	0.592	0.557
Spouse Absent	0.018	0.017	0.025	0.031
Widowed	0.029	0.040	0.042	0.065
Divorced, Separated	0.061	0.066	0.122	0.132
Urban Residence	0.832	0.650	0.929	0.736
Professionals	0.368	0.133	0.127	0.043
Managers	0.126	0.101	0.029	0.020
Craftsmen	0.085	0.170	0.086	0.108
Operatives	0.025	0.173	0.073	0.259
Laborers	0.010	0.036	0.059	0.103
Service	0.028	0.072	0.136	0.196
Disability	0.053	0.066	0.059	0.075
ln E	8.965	7.745	8.408	7.399
Earnings	$7,824.38	$2,309.99	$4,482.79	$1,634.35
ln W	1.431	0.350	0.947	0.125
Wage Rage	$4.18	$1.42	$2.58	$1.33
Hours Worked	40.795	41.135	40.071	38.146
Weeks Worked	48.669	45.715	47.251	44.439

Appendix A--Continued

Means	Males in 1970 (WC)		Females in 1970 (WC)	
	Federal	Private	Federal	Private
Constant	1.000	1.000	1.000	1.000
Education	15.111	12.679	14.511	12.896
Experience	21.595	22.486	18.069	20.883
Experience Squared	629.282	740.191	523.176	677.935
Race	0.230	0.184	0.328	0.235
Spouse Present	0.801	0.751	0.509	0.576
Spouse Absent	0.017	0.017	0.024	0.024
Widowed	0.014	0.018	0.062	0.091
Divorced, Separated	0.042	0.055	0.134	0.119
Urban Residence	0.841	0.642	0.886	0.708
Professionals	0.376	0.125	0.186	0.098
Managers	0.133	0.115	0.047	0.035
Craftsmen	0.134	0.243	0.007	0.019
Operatives	0.053	0.202	0.014	0.173
Laborers	0.035	0.075	0.003	0.012
Service	0.057	0.060	0.056	0.159
Babyborn			1.317	1.780
Disability	0.066	0.076	0.036	0.054
ln E	9.093	7.929	8.367	7.263
Earnings	$8,892.82	$2,776.65	$4,302.71	$1,426.53
ln W	1.510	0.409	0.966	0.135
Wage Rate	$4.53	$1.51	$2.63	$1.15
Hours Worked	41.714	43.451	38.803	35.907
Weeks Worked	49.347	47.294	46.582	42.485

Appendix A--Continued

Means	White Males in 1970 (WC) Federal	White Males in 1970 (WC) Private	White Females in 1970 (WC) Federal	White Females in 1970 (WC) Private
Constant	1.000	1.000	1.000	1.000
Education	15.688	13.091	14.709	13.248
Experience	21.623	22.250	19.265	20.457
Experience Squared	622.379	723.538	580.292	655.910
Spouse Present	0.832	0.780	0.528	0.608
Spouse Absent	0.013	0.014	0.027	0.021
Widowed	0.011	0.015	0.062	0.084
Divorced, Separated	0.034	0.044	0.112	0.103
Urban Residence	0.818	0.625	0.859	0.693
Professionals	0.447	0.144	0.223	0.114
Managers	0.163	0.135	0.057	0.042
Craftsmen	0.129	0.257	0.004	0.021
Operatives	0.035	0.180	0.007	0.162
Laborers	0.014	0.051	0.001	0.010
Service	0.034	0.040	0.017	0.128
Babyborn			1.116	1.619
Disability	0.064	0.077	0.033	0.047
ln E	9.242	7.977	8.452	7.345
Earnings	$10,321.66	$2,913.18	$4,684.43	$1,548.43
ln W	1.640	0.435	1.046	0.204
Wage Rate	$5.16	$1.55	$2.85	$1.23
Hours Worked	41.902	44.181	38.748	36.023
Weeks Worked	49.635	47.490	46.883	42.657

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Appendix A--Continued

Means	Non-White Males in 1970 (WC) Federal	Non-White Males in 1970 (WC) Private	Non-White Females in 1970 (WC) Federal	Non-White Females in 1970 (WC) Private
Constant	1.000	1.000	1.000	1.000
Education	13.183	10.852	14.107	11.754
Experience	21.503	23.533	15.616	22.666
Experience Squared	652.341	813.997	406.153	749.460
Spouse Present	0.698	0.625	0.471	0.472
Spouse Absent	0.031	0.031	0.018	0.032
Widowed	0.023	0.029	0.062	0.112
Divorced, Separated	0.072	0.102	0.179	0.170
Urban Residence	0.918	0.718	0.941	0.758
Professionals	0.141	0.039	0.111	0.048
Managers	0.033	0.025	0.025	0.013
Craftsmen	0.149	0.182	0.015	0.015
Operatives	0.112	0.299	0.028	0.209
Laborers	0.104	0.178	0.007	0.019
Service	0.134	0.146	0.138	0.258
Babyborn			1.729	2.302
Disability	0.072	0.076	0.044	0.075
ln E	8.596	7.717	8.194	6.997
Earnings	$5,409.98	$2,246.21	$3,619.17	$1,093.35
ln W	1.075	0.295	0.802	-0.089
Wage Rate	$2.93	$1.34	$2.23	$ .92
Hours Worked	41.088	40.218	38.916	35.530
Weeks Worked	48.384	46.426	45.964	41.930

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